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ABSTRACT

This publication incorporates the topics and concepts of the New York State Education syllabi for mathematics from Pre-K through 12. The first section, "K-8 Mathematics Scope and Sequence," lists the New York City (NYC) mathematics performance objectives for grade levels K-8 sequentially by mathematical topic. The objectives for each module are coded using the NYC coding system. The second section, "Fundamentals of Mathematics," is designed to provide appropriate mathematics experiences for pre-algebra students. These experiences emphasize the development of computational skills, mathematical concepts, and problem-solving techniques. It may be used as the basis for a 1-year course. The complete course is divided into 12 basic units. The last two sections, "Consumer Mathematics (Part 1 and Part 2)" are designed to improve mathematical proficiency and understanding as the student is given practice in relevant problem-solving situations. The purpose of this course is to review, reinforce, and extend concepts learned in the second section. Part 2 contains computer applications for many of the topics contained in Part 1. The lessons involve using electronic spreadsheets and applying them to real-life situations. (YP)

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Essential Learning Outcomes

MATHEMATICS

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Essential Learning Outcomes

MATHEMATICS

3

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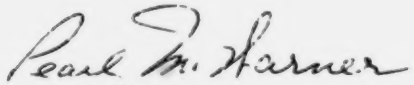
FOREWORD

Since the publication of *Minimum Teaching Essentials,* the State Education Department has restructured educational requirements as outlined in the Regents Action Plan.

Effective implementation of these changes necessitates extensive and ongoing staff and curriculum development in all subject areas. In response to the need for a comprehensive overview of the learning outcomes to be expected, from PreK through Grade 12, the Division has prepared this edition of *Essential Learning Outcomes.*

These *Essential Learning Outcomes,* in communication arts, mathematics, science, and social studies, incorporate the new topics and concepts of the corresponding State Education syllabi, and have been designed to give educators a sense of the continuum within a particular subject area, as well as a knowledge of the content and basic skills needed in these disciplines at each grade level.

We hope that you, the teachers and supervisors of New York City, will find these guides useful in defining the educational goals and objectives for all students in general and special education. The implementation of these essential learning goals and objectives in the classroom can be realized only with the dedication of the entire New York City educational community. Please send us your comments and reactions to guide us in future revisions.



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ACKNOWLEDGMENTS

The objectives listed in this document are those that conform to the existing courses which were prepared by teachers and supervisors for the Mathematics Unit of the Division of Curriculum and Instruction, Pearl M. Warner, Executive Director (Acting), Susan Zakaluk, Director of Mathematics.

Morris Freedman, Assistant Administrative Superintendent, provided overall supervision of this project.

This document was produced by the Curriculum Editorial Unit (Alaire Mitchell, Assistant Director of Curriculum Research). Maureen Maguire was project editor. Hillary Mumma assisted in the development of this document. Typesetting was done by Deirdre Stapp and Malika Stanley. Cover design by Diane Lightsey.

HOW TO USE THIS BULLETIN

The expected mathematics outcomes for students in Kindergarten through Grade 8 are presented in strands. Each strand is covered in greater and greater depth and complexity as the student matures. The coding system accompanying these outcomes is explained on page 4.

Two mathematics courses are required for the high school diploma. The objectives included in this document are taken from *Fundamentals of Mathematics* and *Consumer Mathematics* since these are the courses most frequently taken by non-Regents students. The objectives of any other course of study approved by the Division of Curriculum and Instruction may be used instead. In particular, *Computer Mathematics* or *Sequential Mathematics, Course One* may be considered.

In general, a student with math and reading skills at or above grade level should *not* be scheduled for *Fundamentals of Mathematics,* but should take the first course in the three-year Regents sequence: *Sequential Mathematics Course One.* Detailed information about the three-year Regents Mathematics Sequence (Course One, Course Two, Course Three), not included in this document, may be obtained from the school mathematics department. In some cases, schools have established special programs (e.g. double period or extended-time plans) which allow them to place students with skills slightly below grade level into *Sequential Mathematics Course One* rather than *Fundamentals of Mathematics.* The building Assistant Principal/Supervision of Mathematics should be consulted regarding guidelines for placement of students in mathematics classes.

CONTENTS

SECTION 1. K-8 Mathematics Scope and Sequence . . . 1
SECTION 2. Fundamentals of Mathematics 87
SECTION 3. Consumer Mathematics, Part 1 113
SECTION 4. Consumer Mathematics, Part 2 137

MATHEMATICS

Scope and Sequence

Kindergarten - Grade 8

K-8 Mathematics Scope and Sequence by Topic

Introduction

This document lists the New York City mathematics performance objectives for grade levels K-8 sequentially by mathematical topic, rather than in cyclical teaching sequence for each grade level—as found in the New York City Mathematics Scope and Sequence bulletins and in the CIMS* Mathematics Program. The objectives for each module are coded using the NYC coding system. Each module corresponds to a unit of instruction found in the New York City Mathematics Scope and Sequence bulletins and in the CIMS Mathematics Program. The most current city and state guidelines were used in formulating the modules and sequence of this curriculum.

For many students, a cyclical curriculum approach provides an effective instructional program. However, teachers will find the following sequential listing of mathematics objectives by topic to be particularly useful in developing effective mathematics instruction for individual students with special needs, or when planning supplemental mathematics remediation for an individual student.

Prior to instruction in any given topic, the teacher can use the sequential listing of objectives to informally assess student competencies for that topic (see sample informal assessment/progress chart). After identifying the student's present level of performance, the teacher can design instruction and/or remediation to meet individual student needs based upon those sequential objectives which need to be mastered to bring the student to grade level for that topic ("strand"). By repeating this procedure for each of the thirteen content strands of the mathematics curriculum, the teacher can design a plan matching the entire general education curriculum—for each student with special needs—to the maximum extent possible (see mathematics mastery profile chart).

HOW TO ORGANIZE INSTRUCTION FOR STUDENTS WITH SPECIAL NEEDS

Students with special needs may require specialized instructional strategies such as continual repetition and intensive focus on specific subskills to ensure mastery, retention, transfer and generalization of knowledge. Therefore, the continuity found in a one-topic-at-a-time approach may be preferred over the cyclical approach for some students. However, even if a topical (rather than cyclical) approach is selected, CIMS Mathematics Program materials and specific instructional strategies can be referenced through the module coding which accompanies the objectives list. Commercial mathematics programs, supplemental materials, and curriculum adaptations (see *Adapting Curriculum for Special Education Students: A Teacher's Handbook)* may also be utilized to ensure mastery of these objectives.

*Comprehensive Instructional Management Systems is a writing group within the mathematics unit which produces instructional materials directly related to the NYC Scope and Sequence for each grade.

Module Coding Key

Level (Grade) Here Grade 4 (Note: 0 = Kindergarten)
Topic or "strand" (Topic 6 is Fractions)
"Module number" 3 here indicates that this is the third unit from this topic to occur in this grade (viz., this is the third time during grade 4 that a mathematics unit treats fractions)
4.06.03

Module 4.06.03 is "EQUIVALENT FRACTIONS," which happens to be the 26th Unit (and the third addressing fractions) to occur in the grade 4 sequence.

4.06.03.**02A**

The last number and the letter in the code denote a particular *objective* within the unit, and the expected level of mastery by students in this grade.

Objective 4.06.03.**02A** is "Match a set of equivalent fractions with its corresponding point on the number line," the second of several objectives in this unit.

Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the **New York City Mathematics Curriculum**. Performance objectives with the greatest priority are so basic that unless that student acquires a satisfactory degree of competency in them, the student cannot progress. These objectives are marked (A) and mastery by all pupils is essential.

Performance objectives marked (B) are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked (C) are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary:
(A) Mastery of this objective is essential for progress. Opportunities for reinforcement should be provided throughout the school year.

(B) These objectives pertain to all students. Mastery is not essential at this time because the topics will be further developed and reinforced, usually in the following year. Presentation of the concept in this grade is needed to facilitate mastery in the future.

(C) Objectives of special interest.

Sample Informal Assessment/Progress Chart to Guide Instruction on a Mathematics Topic ("Strand")

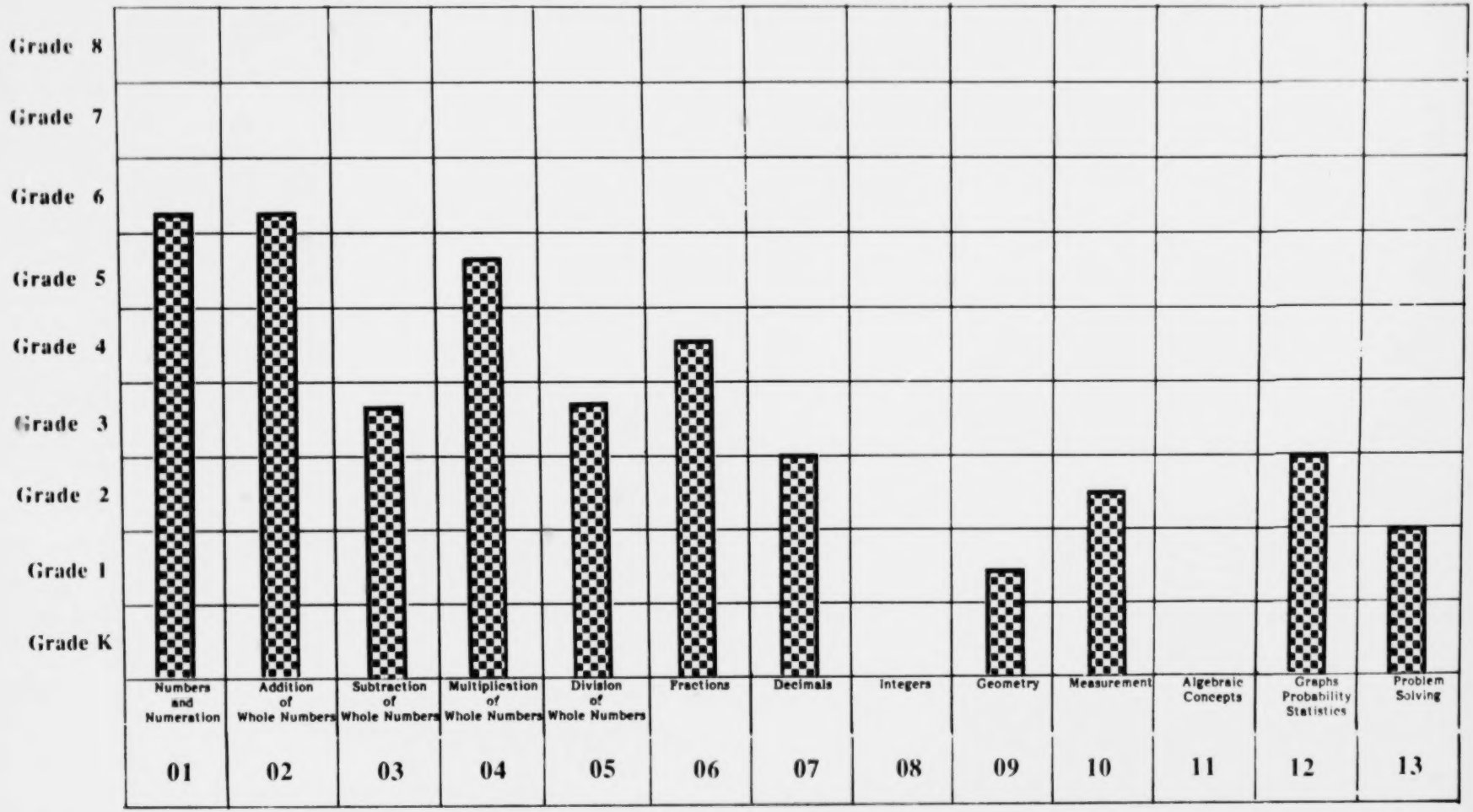
SAMPLE STUDENT: Attends special education class with a sixth grade designation.

SAMPLE TOPIC: FRACTIONS (06) - initial assessment on September 15.

Notes	Module Code	Date of Mastery
	8.06.05	
	8.06.04	
	8.06.03	
	8.06.02 A/B	
	8.0_.01	
	7.06.05	
	7.06.04	
	7.06.03	
Sample student is in sixth grade — should complete this module by end of school year	7.06.02	
	7.06.01 C	
	6.06.07	
	6.06.06	
	6.06.05 A/B	
	6.06.04	
	6.06.03 A/B	
	6.06.02	
	6.06.01 A/B	
	5.06.10 A/B	
	5.06.09 A/B	
	5.06.08 B	
	5.06.07	
	5.06.06	
	5.06.05	
	5.06.04	
	5.06.03 A/B	9/15
	5.06.02	
	5.06.01 A/B	
	4.06.09	9/15
	4.06.08 B	
	4.06.07 B	
Remediation and instruction on fractions should begin here	4.06.06 B	
	4.06.05	
	4.06.04	9/15
	4.06.03	9/15
	4.06.02 B	9/15
	4.06.01	9/15
	3.06.05 B	9/15
	3.06.04 B	
	3.06.03 B	9/15
	3.06.02 B	9/15
	3.06.01	9/15
	2.06.02	9/15
	2.06.01	9/15
	1.06.03 B	9/15
	1.06.02 B	9/15
	1.06.01 B	9/15
	0.06.04	9/15
	0.06.03	9/15
	0.06.02	9/15
	0.06.01	9/15

MATHEMATICS MASTERY PROFILE

STUDENT SAMPLE GRADE 5 DATE 9/15



MATHEMATICS MASTERY PROFILE

STUDENT_____ **DATE**_____

	Numbers and Numeration	Addition of Whole Numbers	Subtraction of Whole Numbers	Multiplication of Whole Numbers	Division of Whole Numbers	Fractions	Decimals	Integers	Geometry	Measurement	Algebraic Concepts	Graphs Probability Statistics	Problem Solving
Grade 8													
Grade 7													
Grade 6													
Grade 5													
Grade 4													
Grade 3													
Grade 2													
Grade 1													
Grade K													
	01	02	03	04	05	06	07	08	09	10	11	12	13

Table of Contents for Mathematics Scope and Sequence by Topics Grades K-8

Topic Number	Topic	Page
01.	Numbers and Numeration	11
02.	Addition of Whole Numbers	25
03.	Subtraction of Whole Numbers	31
04.	Multiplication of Whole Numbers	35
05.	Division of Whole Numbers	39
06.	Fractions	43
07.	Decimals	51
08.	Integers	55
09.	Geometry	57
10.	Measurement	63
11.	Algebraic Concepts	73
12.	Graphs, Probability, Statistics	77
13.	Problem Solving	83

NUMBERS AND NUMERATION

Topic 01

0.01.01 **Identification of numbers around us**
The student will be able to . . .
- identify number names in the environment

0.01.02 **Spatial relationships**
The student will be able to . . .
- distinguish between in front of and in back of
- distinguish between up and down
- distinguish between above and below
- distinguish between on and off
- distinguish between over and under

0.01.03 **Classification by attributes**
The student will be able to . . .
- order sets of objects from smallest to largest
- order sets of objects from largest to smallest
- distinguish likenesses and differences
- distinguish between same and different
- solve oral word problems using skills learned in this module

0.01.04 **Groups**
The student will be able to . . .
- recognize the number of objects in a group without counting

0.01.05 **Comparison of sets**
The student will be able to . . .
- distinguish between all and none
- compare two groups of objects to determine which group has more objects
- compare two groups of objects to determine which group has less objects
- compare two groups of objects to determine which group has more or less objects
- compare two groups of objects to determine if the number of objects in both groups is the same

0.01.06 **Vocabulary**
The student will be able to . . .
- distinguish between not enough and extra
- recognize enough by means of sharing
- identify amounts which are the same and amounts which are different
- distinguish between more and less
- distinguish between most and least
- distinguish among many, as many as, and fewest

0.01.07 **Numerals one (1) through four (4)**
The student will be able to . . .
- associate the numerals 1 through 4 with a group (set, lot, bunch, heap, pile) having one through four objects
- recognize and identify the symbols 1 through 4 as numerals for the numbers one through four
- write the numerals 1 through 4
- identify the number of elements in given groups (1 through 4) by counting

0.01.08 **More identification of numbers around us**
The student will be able to . . .
- identify personal data

0.01.09 **Spatial relationships — extended vocabulary**
The student will be able to . . .
- distinguish between top and bottom
- distinguish between before and after
- distinguish between inside and outside
- distinguish between in and on
- distinguish between left and right
- distinguish between next to and between
- distinguish among first, middle and last

0.01.10 **Conservation of the number in a set**
The student will be able to . . .
- name sets of objects arranged in vertical, horizontal or random position
- name the number in a set of objects in a vertical, horizontal or random position
- understand that counting objects in different positions does not change the number

0.01.11 **Numerals five (5) through nine (9)**
The student will be able to . . .
- associate the numerals 5 through 9 with a group (set, lot, bunch, heap, pile) having five through nine objects
- recognize and identify the symbols 5 through 9 as numerals for the numbers five through nine
- write the numerals 5 through 9
- identify the number of elements in a given group (5 through 9)

0.01.12 **Numeral zero (0)**
The student will be able to . . .
- associate the numeral 0 with a group (set, lot, bunch, heap, pile) having no objects
- recognize and identify the symbol "0" as a numeral for the number zero
- write the numeral 0
- identify the elements in a group of zero objects

0.01.13 **Numeral 10**
The student will be able to . . .
- associate the numeral 10 with a group (set, lot, bunch, heap, pile) having ten objects
- recognize and identify the symbol "10" as a numeral for the number ten
- write the numeral 10
- recite the numerals 1 through 10 in correct counting order
- identify the number of objects in a group of ten objects

0.01.14 **Sequence**
The student will be able to . . .
- pick the object or number that comes before a given object or number
- pick the object or number that comes after a given object or number
- pick the number that is between two objects or numbers

0.01.05 **Ordinal numbers first through fourth**
The student will be able to . . .
- identify the ordinal position of each object in a row through 4 objects
- match the ordinal numbers first through fourth to the cardinal numbers (numerals) one to four
- identify the numeral associated with a given ordinal number
- recite the ordinal names first through fourth

0.01.16 **Construct and count using a number line**

The student will be able to . . .

- construct a number line
- count forward and backward on the number line
- compare the cardinal number of a set of concrete objects by matching them with the numbers on a number line

0.01.17 **Ordinal numbers first through tenth**

The student will be able to . . .

- match the ordinal numbers first through tenth to the cardinal numbers one through ten
- recite the ordinal names first through tenth

0.01.18 **Numerals eleven (11) through fifteen (15)**

The student will be able to . . .

- associate the numerals 11 through 15 with a group (set, lot, bunch, heap, pile) having eleven through fifteen objects
- recognize and identify the symbols 11 through 15 as numerals for the numbers eleven through fifteen
- identify the elements in a given group
- recite the numerals 1 through 15 in correct counting order

1.01.01 **Spatial relationships**

The student will be able to . . .

- distinguish between up and down (A)
- distinguish between above and below (A)
- distinguish among in, on and off (A)
- distinguish between over and under (A)
- distinguish between top and bottom (A)
- distinguish between inside and outside (A)

1.01.02 **Spacial relationships extended**

The student will be able to . . .

- distinguish between in front of and behind (A)
- distinguish among before, after, between and next to (A)
- distinguish between left and right (A)
- distinguish among first, middle and last (A)

1.01.03 **Classification by attributes**

The student will be able to . . .

- distinguish between same and different (A)
- distinguish among the concepts of large, larger, and largest (A)
- distinguish among the concepts of small, smaller, and smallest (A)
- distinguish between likenesses and differences (A)
- solve oral story problems using the skills learned in this module (A)

1.01.04 **One-to-one and more than one correspondence**

The student will be able to . . .

- pair objects from unlike sets by means of a one-to-one correspondence without counting (A)
- group objects from unlike sets by means of a two-to-one correspondence without counting (A)
- group objects from unlike sets by means of a many-to-one correspondence without counting (A)

1.01.05 **Sets**

The student will be able to . . .

- identify a set as a collection or group of objects (B)
- identify the members of a set determined by a specific characteristic (B)
- identify the empty set (B)

1.01.06 **Compare groups of 1 through 5 objects**

The student will be able to . . .

- compare groups (sets, bunches, lots, heaps, piles) of 1 through 5 objects by matching and showing which have the same number of objects (A)
- compare groups of 1 through 5 objects by matching and showing which have more objects when given two groups of objects (A)
- compare groups of 1 through 5 objects by matching and showing which have fewer objects, when given two groups of objects (A)
- compare groups of 1 through 5 objects by matching and showing "more" and "fewer" when given two groups of objects (A)

1.01.07 **Quantities**

The student will be able to . . .

- distinguish between all and none (A)
- distinguish between most and least (A)
- decide whether the groups (sets, lots, bunches, heaps, piles) have the same number of objects (as many as) (A)
- distinguish between more than and less than (A)
- distinguish between not enough and extra (A)

1.01.08 **Numerals one (1) through five (5)**

The student will be able to . . .

- associate the numerals 1 through 5 with a group (set, lot, bunch, heap, pile) having one through five objects (A)
- recognize and identify the symbols "1" through "5" as numerals for the numbers one through five (A)
- recite the numerals 1 through 5 in correct counting order (A)
- write the numerals 1 through 5 (A)
- identify the number of objects in a given group of 1 through 5 (A)
- associate the number words "one" through "five" with the numerals 1 through 5 and with groups having one through five objects (A)
- locate where you can find the numerals 1 through 5 in the home, school and/or neighborhood (B)

1.01.09 **Numerals six (6) through nine (9)**

The student will be able to . . .

- identify and associate the numerals 6 through 9 with a group (set, lot, bunch, heap, pile) having six through nine objects (A)
- associate the number words six through nine with the numerals 6 through 9 and with groups having six through nine objects (B)
- locate where you can find the numerals 6 through 9 in the home, school and/or neighborhood (A)

1.01.10 **Order numerals one (1) through nine (9)**
The student will be able to . . .
- identify and order the numerals and number words from 1 through 9 (A)
- identify the numeral that comes one after a given numeral (1 through 9) (A)
- identify the numeral that comes one before a given numeral (1 through 9) (A)
- identify the counting number that comes between two given counting numbers (A)

1.01.11 **Ordinal numbers first through fifth**
The student will be able to . . .
- identify the ordinal position of each object in a row of 1 through 5 objects (B)
- recite the ordinal names (B)
- match the ordinal number words first through fifth to the cardinal numbers 1 through 5 (B)
- write the numeral form for the given ordinal number word (B)

1.01.12 **The numeral zero (0)**
The student will be able to . . .
- associate the numeral 0 with a group (set, lot, bunch, heap, pile) having no objects (A)
- recognize, identify and write the symbol 0 as a numeral for the number zero (A)
- match the number word zero to the numeral 0 and to a group (set, lot, bunch, heap, pile) having no objects (B)

1.01.13 **The numeral ten (10)**
The student will be able to . . .
- identify and associate the numeral 10 with a group (set, lot, bunch, heap, pile) having ten objects (A)
- associate the number word ten with the numeral 10 and with a group (set, lot, bunch, heap, pile) having ten objects (B)
- recite, count and write the numerals 0 through 10 forward and backward in correct counting order (A)

1.01.14 **Ordinal numbers first through tenth**
The student will be able to . . .
- identify the ordinal position of each object in a row, through 10 objects (A)
- match the ordinal number names first through tenth to the cardinal numbers 1 through 10 (B)

1.01.15 **Use the equal symbol** (=) to compare groups from 0 through 10 objects
The student will be able to . . .
- compare groups with 0 through 10 objects having the same number of objects (A)
- compare equal groups with 0 through 10 objects using the relation symbol = (equal) (A)
- compare the numbers 0 through 10 using the equal relation symbol (=) (A)

1.01.16 **Greater than (>) and less than (<) symbols**
The student will be able to . . .
- identify the group having more objects (A)
- use the greater than relation symbol (>) to compare numerals 0 through 10 (B)
- identify the group having fewer objects (A)
- use the less than relation symbol (<) to compare numerals 0 through 10 (B)

1.01.17 **Count and group by tens through fifty**
The student will be able to . . .
- identify groups of 10 (A)
- order and write numbers 10 through 50 by tens (A)

1.01.18 **Place value from 10 through 50**
The student will be able to . . .
- identify and write the place value of numerals 10 through 50 (A)
- write the numerals 10 through 50 in expanded notation (A)

1.01.19 **Order numerals from 10 through 50**
The student will be able to . . .
- identify the numeral that comes one after a given numeral (10 through 50) (B)
- count and write by ones from 10 through 50 in correct counting order (A)
- identify the numeral that comes one before a given numeral (10 through 50) (B)
- count and write backwards by ones from 50 (B)
- identify the numeral that comes between two given numerals (B)
- solve story problems related to skills learned in this module (A)

1.01.20 **Place value from 50 through 99**
The student will be able to . . .
- order and write numbers 50 through 90 by tens (A)
- identify and write the place value of numerals from 51 through 99 (A)
- write the numerals 51 through 99 in expanded notation (B)

1.01.21 **Order numerals from 51 through 99**
The student will be able to . . .
- count and write by ones from 51 through 99 in correct counting order (A)
- identify the numeral that comes one after a given numeral (51 through 99) (B)
- identify the numeral that comes one before a given numeral (51 through 99) (B)
- identify the numeral that comes between two given numerals (B)

1.01.22 **Count by twos through 98**
The student will be able to . . .
- identify the numerals in order from 0 through 98, counting by twos (B)
- write the numerals in counting order from 0 through 98, counting by twos (B)

1.01.23 **Even and odd numbers through 99**
The student will be able to . . .
- decide whether or not a group (set, lot, bunch, heap, pile) has an even number of objects (A)
- identify even numbers from 0 through 98 (B)
- identify numbers that are odd (not even) from 1 through 99 (B)

2.01.01 **Count hundreds through ten hundred (1000)**

The student will be able to . . .

- count forward and backward by hundreds through ten hundred (1000) (B)
- write the numbers from 100 through 1000 by hundreds (B)
- identify and write the hundred that comes between a given pair of hundreds through 1000 (A)
- identify and write the number that comes one hundred before and one hundred after a given number (A)

2.01.02 **Read and write standard numerals (100 through 1000)**

The student will be able to . . .

- count and write numbers forward and backward through 1000 without bridging the hundreds (B)
- identify and write the number that comes exactly between a given pair of numbers through 1000 (A)
- identify the number that comes one before and one after a given number through 1000 (A)
- count forward and backward by ones bridging the hundreds (99 through 1000) (B)

2.01.03 **Count by tens and fives to 1000**

The student will be able to . . .

- count and order numbers 50 through 100 by tens (A)
- write numbers 50 through 100 by tens (A)
- count and order numbers 100 through 1000 by tens (A)
- write numbers 100 through 1000 by tens (A)
- count and order numbers 0 through 1000 by fives (A)
- write numbers 0 through 1000 by fives (A)

2.01.04 **Relation symbols** =,< , >

The student will be able to . . .

- compare the numbers 0 through 1000 using the relation symbol = (equal) (A)
- compare the numbers 0 through 1000 using the relation symbol > (greater than) (A)
- compare the numbers 0 through 1000 using the relation symbol < (less than) (A)
- compare the numbers 0 through 1000 using the relation symbols =, >, < (A)

2.01.05 **Even and odd numbers**

The student will be able to . . .

- identify even numbers from 100 through 1000 (A)
- identify odd numbers (not even) from 101 through 999 (A)
- complete even and odd number sequences (A)

2.01.06 **Round numbers through 99 to the nearest ten**

The student will be able to . . .

- round a 2-digit number, having its ones digit less than 5, to the nearest ten (A)
- round a 2-digit number, having its ones digit more than 5, to the nearest ten (A)
- round a 2-digit number, having 5 in the ones place, to the nearest ten (A)

2.01.07 **Place value through 999**

The student will be able to . . .

- identify the place value of any digit in a numeral less than 1000 (A)
- identify the meaning of zero in the place value system (A)
- write a given numeral in expanded form (A)
- write a standard numeral when the expanded form is given (A)

2.01.08 **Ordinal numbers eleventh through thirty-first**

The student will be able to . . .

- identify the ordinal position of each object in a row through 20 objects (B)
- identify the ordinal position of each object in a row through 31 objects (B)

2.01.09 **Identify and write Roman numerals I-XII**

The student will be able to . . .

- identify the Roman numerals I, V and X (C)
- identify and write Roman numerals from I through XII (1 through 12) (C)

2.01.10 **Count forward and backward by patterns of three**

The student will be able to . . .

- identify the numbers from 0 through 99 counting by threes (B)
- write and order the numbers from 0 through 99, counting by threes (B)
- count and write the numbers from 99 through 0 (in backward order) by threes (C)

2.01.11 **Count forward and backward by patterns of four**

The student will be able to . . .

- identify the numbers from 0 through 100 counting by fours (B)
- order and write the numbers from 0 through 100 counting by fours (B)
- order and write the numbers from 100 through 0 (in backward order) counting by fours (B)

3.01.01 **Count by tens and hundreds through 1000**

The student will be able to . . .

- count and write by ones forward and backward bridging the hundreds (99 through 1000) (A)
- count and write by tens forward and backward within the hundreds (A)
- count and write by hundreds forward and backward to and from 1000 (A)

3.01.02 **Round 3-digit numbers to the nearest ten/hundred**

The student will be able to . . .

- estimate large numbers (B)
- round a 3-digit number, having its tens digit less than 5, to the nearest hundred (A)
- round a 3-digit number, having its tens digit more than 5, to the nearest hundred (A)
- round a 3-digit number, having 5 for its tens digit, to the nearest hundred (A)
- round a 3-digit number to the nearest ten (A)

3.01.03 **Place value through 9,999**

The student will be able to . . .

- identify and write 4-digit numbers in expanded notation (A)
- identify and write a 4-digit number in standard form given its expanded notation (A)
- regroup hundreds as thousands (B)
- regroup thousands as hundreds (B)
- write 4-digit numbers with a comma between the thousands and hundreds places (A)

3.01.04 **Order numbers through 9,999**
The student will be able to . . .
- order 3-digit numbers in both increasing and decreasing orders (A)
- order 4-digit numbers in both increasing and decreasing orders (B)

3.01.05 **Even and odd numbers**
The student will be able to . . .
- identify even and odd addition patterns of whole numbers (A)
- identify even and odd subtraction patterns of whole numbers (A)

3.01.06 **Count by twos, threes, fours, fives**
The student will be able to . . .
- count by twos forward and backward within the hundreds (A)
- count by fives forward and backward within the hundreds (A)
- count by threes forward and backward within the hundreds (A)
- count by fours forward and backward within the hundreds (A)

3.01.07 **Ordinal numbers through 500**
The student will be able to . . .
- use an ordinal number to name a position in a row up to 99 (A)
- identify the ordinal position of each object in a row or series up to 500 objects (A)
- write cardinal numbers with corresponding ordinal numbers (B)

3.01.08 **Negative numbers**
The student will be able to . . .
- identify the negative (–) sign for numbers and use negative numbers in real life situations (B)
- locate the points for the negative numbers on a number line (B)

3.01.09 **Roman numerals**
The student will be able to . . .
- identify and write Roman numerals from XIII through XXXIX (13 through 39) (B)
- solve word problems related to skills learned in this module (B)

4.01.01 **Place value through thousands**
The student will be able to . . .
- regroup hundreds as thousands (A)
- regroup thousands as hundreds (A)
- order 4-digit numbers in both increasing and decreasing orders (A)

4.01.02 **Place value of 5- and 6-digit numbers**
The student will be able to . . .
- use a place value chart to interpret 5- and 6-digit numbers (A)
- identify and write 5- and 6-digit numbers in expanded notation (A)
- identify and write 5- and 6-digit numbers in standard form given their expanded notation (A)

4.01.03 **Round 4- and 5-digit numbers**
The student will be able to . . .
- round 4- and 5-digit numbers to the nearest thousand (A)
- round 4- and 5-digit numbers to the nearest hundred (A)

4.01.04 **Even and odd patterns with addition and subtraction**
The student will be able to . . .
- define an even number as a number which is divisible by 2 or when divided by 2 leaves no remainder (A)
- define an odd number as a number which, when divided by 2, has a remainder of 1 (A)
- use and addition chart to determine even and odd sums (A)
- determine if differences of even and odd numbers are even or odd (A)

4.01.05 **Prime numbers**

The student will be able to . . .

- recognize that a prime number has only two factors, one and itself (A)
- list all the prime numbers through one hundred (A)
- identify a composite number as any whole number having more than two factors (A)
- rename a composite number as a product of its primes (A)

4.01.06 **Roman system to symbol C**

The student will be able to . . .

- identify the Roman symbols I, V, and X and use them to write Roman numerals from I through XXXIX (1 through 39) (A)
- identify the Roman symbols L and C and use them, with I, V, and X, to write Roman numerals from XL through C (40 through 100) (A)
- rename a Roman numeral as its Arabic equivalent (B)
- identify and write Roman numerals from CI through CCCXCIX (101 through 399) (C)

4.01.07 **Patterns in numeration**

The student will be able to . . .

- find patterns in a sequence of numbers and complete the sequence (A)
- find patterns for square numbers (B)
- find patterns for triangular numbers (B)

4.01.08 **Place value through hundred millions**

The student will be able to . . .

- identify place value through millions (A)
- identify place value through hundred millions (B)
- identify and write 7-, 8-, and 9-digit numbers in expanded form (B)
- identify and write 7-, 8-, and 9-digit numbers in standard form when given the expanded form (B)
- translate a verbal phrase into a numeral and a numeral into a verbal phrase (B)

5.01.01 **Round 5- and 6-digit numbers**

The student will be able to . . .

- round 5-digit numbers to the nearest ten thousand (A)
- round 6-digit numbers to the nearest ten thousand (B)
- round 6-digit numbers to the nearest hundred thousand (B)
- solve word problems related to skills learned in this module (B)

5.01.02 **Sets**

The student will be able to . . .

- identify a set as a group of items and write sets using set notation (A)
- identify and write, in set notation, the union ($\cup$) of two finite sets (B)
- identify and write, in set notation, the intersection ($\cap$) of two sets (B)
- identify and write, in set notation, the empty (or null) set (B)
- identify the subsets of a given set (B)
- identify equivalent sets (B)

5.01.03 **Venn diagrams**

The student will be able to . . .

- identify the union of two sets using Venn diagrams (B)
- identify the intersection of two sets using Venn diagrams (B)
- identify a subset of a universal set, and its complement, using Venn diagrams (B)

5.01.04 **Exponents**

The student will be able to . . .

- identify and define the exponent as the numeral written above and to the right of the base to show how many times the base is used as a factor (A)
- express in standard form a number presented in exponential form (A)
- express in standard form powers of ten presented in exponential form (A)
- express in exponential form powers of ten that are presented in standard form (A)

5.01.05 **Place value through hundred millions**

The student will be able to . . .

- identify place value through hundred millions (A)
- identify and write 7-, 8-, or 9-digit numbers in standard and expanded forms (A)
- identify and write numbers up to 9 digits in exponential form (B)
- compare two 6-, 7-, 8-, or 9-digit numbers using the correct relation symbol (>, <) (A)
- translate a verbal phrase into a numeral and translate a numeral into a verbal phrase (A)

5.01.06 **Roman numerals to MM**

The student will be able to . . .

- identify the Roman symbol D and use it, with I, V, X, L, and C, to write Roman numerals through 899 (DCCCXCIX) (B)
- identify the Roman symbol M and use it, with I, V, X, L, C, and D, to write Roman numerals from 900 through 2000 (CM through MM) (B)
- rename a Roman numeral as its Arabic equivalent (C)

5.01.07 **Place value through billions**

The student will be able to . . .

- identify place value through billions (A)
- identify place value through hundred billions (C)

5.01.08 **Base five**

The student will be able to . . .

- identify the basic symbols in base five (B)
- read a base five place value chart (B)
- find the base ten equivalent of a base five numeral (B)
- find the base five equivalent of a base ten numeral (C)

5.01.09 **Base twelve**

The student will be able to . . .

- identify the pattern of symbols in a base 12 (duo-decimal) system (B)
- find the base ten equivalent of a base twelve numeral (B)
- find the base twelve equivalent of a base ten numeral (C)

6.01.01 **Read, write and understand large numbers**

The student will be able to . . .

- identify and write numbers through 10-digits in expanded notation (A)
- identify and write the standard numeral given the expanded form of numbers through 10-digits (A)
- rename a standard numeral in expanded notation using exponents (A)
- compare two large numbers using the symbols <, >, = (A)
- solve word problems related to skills learned in this module (A)

6.01.02 **Exponents**

The student will be able to . . .

- identify and rename a numeral with an exponent as a numeral in standard form (A)
- identify and rename any non-zero number to the zero power as one (B)

6.01.03 **Prime numbers**

The student will be able to . . .

- identify a prime number as a whole number greater than one having only two factors (A)
- identify a composite number as any whole number having more than two factors (B)
- determine the prime factorization of any composite number (B)
- rename a composite number as a product of its primes (B)

6.01.04 **Roman numerals**

The student will be able to . . .

- identify the bar in the Roman numeral system as a symbol for multiplying the number represented without the bar by 1,000 (C)
- rename a Roman numeral (including bar) as its Arabic equivalent (C)
- rename an Arabic numeral as its Roman equivalent (C)

6.01.05 **Base 2**

The student will be able to . . .

- read a place value chart (B)
- find the base ten equivalent of a base two number (B)
- compare numbers in a base two with numbers in base ten (B)

7.01.01 **Palindromes**

The student will be able to . . .

- identify a palindrome (A)
- find a palindrome by repeated additions (B)
- classify a palindrome (B)

7.01.02 **Divisibility rules: 2, 5, 10**

The student will be able to . . .

- identify and use the divisibility rule for 2 (A)
- identify and use the divisibility rule for 5 (A)
- identify and use the divisibility rule for 10 (A)

7.01.03 **Divisibility rules: 3, 4, 6, 9**

The student will be able to . . .

- identify and use the divisibility rule for 3 (A)
- identify and use the divisibility rule for 4 (A)
- identify and use the divisibility rule for 6 (A)
- identify and use the divisibility rule for 9 (A)

7.01.04 **Triangular numbers, square pattern**

The student will be able to . . .

- identify and construct triangular numbers (A)
- identify the patterns for triangular numbers (A)
- construct a square pattern (A)
- identify patterns for squares (A)

7.01.05 **Pascal's triangle**

The student will be able to . . .

- construct Pascal's Triangle (A)
- identify patterns in addition of rows (A)
- identify patterns in Pascal's Triangle (A)

7.01.06 **Fibonacci numbers**

The student will be able to . . .

- list the first 10 numbers in the Fibonacci sequence (B)
- identify patterns with Fibonacci numbers (A)

7.01.07 **Sets**

The student will be able to . . .

- use set notation to list the members of a set from a description of the set (A)
- identify as a finite set a given set with a specific number of elements (A)
- identify as an infinite set a given set with an unlimited number of elements (A)
- determine whether or not two sets are equal or equivalent (A)
- identify an empty set or null set as a given set with no elements (A)
- state the definition of consecutive numbers, even numbers and odd numbers in word problems (A)

7.01.08 **Relationships**

The student will be able to . . .

- determine subsets of a given set (A)
- determine the number of subsets of a finite set of up to eight elements using the expression 2^n, where n is the number of elements in the set (B)
- represent two disjoint sets with a Venn diagram (A)
- represent a set and a subset with a Venn diagram (A)
- represent and list the union of two given sets on a Venn diagram (A)
- represent and list the intersection of two given sets on a Venn diagram (A)
- find the Least Common Multiple (LCM) of the elements of two given sets of multiples (A)

7.01.09 **Prime and composite numbers**
The student will be able to . . .
- determine whether a number is prime or composite (A)
- list and order the prime factors of a number (A)
- express prime factors in exponential notation (A)

7.01.10 **Squares and square roots**
The student will be able to . . .
- find the square of a number (A)
- list the squares of numbers (A)
- identify the positive square root of a number that is a perfect square (A)
- find the positive square root of a decimal fraction which is a perfect square (B)
- solve verbal problems related to skills learned in this module (A)

8.01.01 **Sequences**
The student will be able to . . .
- find a rule for a sequence of numbers (A)
- find additional terms for a given sequence (A)

8.01.02 **Positive exponents**
The student will be able to . . .
- write a standard numeral given a number expressed as a power of ten (A)
- write a standard numeral given a number in exponential form (A)
- write a standard numeral in exponential form (A)

8.01.03 **Negative exponents**
The student will be able to . . .
- evaluate bases with negative and zero exponents (A)
- expand decimals using positive and negative exponents (A)
- recognize and identify a negative exponent as using the reciprocal (A)

8.01.04 **Real numbers**
The student will be able to . . .
- define real numbers as the set of rational and irrational numbers (B)
- match points on a number line with rational and irrational numbers (B)
- order real numbers (B)

ADDITION OF WHOLE NUMBERS

Topic 02

0.02.01 **Addition**
The student will be able to . . .
- recognize that addition is a union of sets
- recognize that when two (non-empty) groups of objects are put together, the resulting group has more objects than either of the two original groups

0.02.02 **Add one**
The student will be able to . . .
- add 1 object to 1 object
- add 1 object to 2 objects
- add 1 object to 3 objects
- add 1 object to 0 objects

0.02.03 **Plus (+) and equal (=) symbols**
The student will be able to . . .
- identify the plus (+) symbol
- identify the equal (=) symbol
- identify the plus (+) and equal (=) symbols in pictorial representations

0.02.04 **Add two**
The student will be able to . . .
- add 2 objects to 1 through 3 objects
- add 2 objects to 0 objects

0.02.05 **Add three**
The student will be able to . . .
- add 3 objects to 1 through 4 objects
- add 3 objects to 0 objects

0.02.06 **Addition extention**
The student will be able to . . .
- add 1 object to 4 through 9 objects
- add 2 objects to 4 through 8 objects
- add 3 objects to 5 through 7 objects

0.02.07 **Add four**
The student will be able to . . .
- add 4 objects to 1 through 4 objects
- add 4 objects to 0 objects
- add 4 objects to 5 and 6 objects

0.02.08 **Add five through nine**
The student will be able to . . .
- add 5 objects to 1 through 5 objects
- add 6 objects to 1 through 4 objects
- add 7 objects to 1 through 3 objects
- add 8 objects to 1 through 2 objects
- add 9 objects to 1 object
- add 5 through 9 objects to 0 objects

1.02.01 **Identify the plus (+) symbol and the equal (=) symbol**
The student will be able to . . .
- recognize that addition is the union of groups (A)
- recognize that when two groups of objects are added together the resulting group is greater than either of the two original groups (A)
- identify the plus (+) symbol (A)
- identify the equal (=) symbol (A)
- identify both the plus (+) and the equal (=) symbols, using a horizontal format (A)

1.02.02 **Number sentences with the plus (+) symbol and the equal (=) symbol**
The student will be able to . . .
- identify a frame as a place for writing a missing numeral in a number sentence (A)
- identify the plus (+) symbol in number sentences using vertical format (A)
- write the plus (+) symbol and the equal (=) symbol in number sentences, using both vertical and horizontal formats (A)

1.02.03 **Commutative property with sums through five**

The student will be able to . . .

- add two numbers having sums of 2 through 5, in both vertical and horizontal formats (A)
- identify the commutative property in addition with sums through 5 (A)
- write addition facts for sums through five, in both vertical and horizontal formats (A)

1.02.04 **Commutative property with sums through ten**

The student will be able to . . .

- write addition facts for the numbers six through ten, in vertical and horizontal formats (A)
- identify the commutative property in addition with sums through ten (A)

1.02.05 **Associative property for three addends**

The student will be able to . . .

- use addition to name the number of objects in the new set formed by joining three sets, using vertical and horizontal formats (A)
- demonstrate that the order of grouping three addends does not change their sum (associative property) (A)
- record repeated addition of three addends (A)

1.02.06 **Sums through eighteen**

The student will be able to . . .

- add two 1-digit numbers having sums through 18 in horizontal and vertical formats (A)
- use an addition table to find sums through eighteen (B)
- identify simple patterns on the addition table (B)
- solve story problems related to skills learned in this module (A)

1.02.07 **Add 2-digit numbers**

The student will be able to . . .

- add a 2-digit number and a 1-digit number without exchange in horizontal and vertical formats (A)
- add multiples of ten (A)
- add two 2-digit numbers without exchange (A)
- solve story problems related to skills learned in this module (A)

2.02.01 **Addition of 2- and 3-digit numbers without regrouping (exchange)**

The student will be able to . . .

- add three or more 2-digit numbers without regrouping (exchange) and check (A)
- add a 3-digit number and a 2-digit number without regrouping (exchange) and check (B)
- add money with one addend through $9.99 without regrouping (exchange) and check (B)
- solve story problems related to skills learned in this module (B)

2.02.02 **Addition of 3-digit numbers without regrouping (exchange)**

The student will be able to . . .

- add two 3-digit numbers without regrouping (exchange) and check (B)
- add three or more 3-digit numbers without regrouping (exchange) and check (B)
- add money through $9.99 without regrouping (exchange) and check (B)
- solve story problems related to skills learned in this module (B)

2.02.03 **Addition of 2- and 3-digit numbers using expanded notation without regrouping (exchange)**

The student will be able to . . .

- add 2-digit numbers using expanded notation without regrouping (exchange) (A)
- add 3-digit numbers using expanded notation without regrouping (exchange) (A)
- add a 2-digit number and a 3-digit number using expanded notation without regrouping (exchange) (A)

2.02.04 **Addition of a 2-digit number and a 1-digit number with regrouping (exchange) ones to tens**

The student will be able to . . .

- add a 2-digit number and a 1-digit number with regrouping (exchange) using expanded notation (B)
- add a 2-digit number and a 1-digit number with regrouping (exchange) ones to tens and check (B)
- solve story problems related to skills learned in this module (B)

2.02.05 **Addition of 2-digit numbers with regrouping (exchange) ones to tens**

The student will be able to . . .

- add two 2-digit numbers with regrouping (exchange) using expanded notation (B)
- add two 2-digit numbers with regrouping (exchange) ones to tens and check (B)
- solve story problems related to skills learned in this module (B)

2.02.06 **Commutative and associative properties of addition through 999**

The student will be able to . . .

- use the commutative property of addition with numbers through 999 (B)
- use tables to discover patterns of the commutative property (B)
- use the associative property of addition with numbers through 999 (C)

2.02.07 **Addition of 2- and 3-digit numbers with regrouping (exchange) ones to tens**

The student will be able to . . .

- add a 3-digit number and a 2-digit number with regrouping (exchange) using expanded notation (B)
- add a 3-digit number and a 2-digit number with regrouping (exchange) and check (B)
- compute addition examples with regrouping (exchange) using money through $9.99 and check (B)
- solve story problems related to skills learned in this module (B)

3.02.01 **Commutative and associative properties of addition through 999**
The student will be able to . . .
- use the commutative property of addition with numbers through 999 (A)
- use the associative property of addition with numbers through 999 (B)

3.02.02 **Addition of 3-digit numbers without regrouping (exchange)**
The student will be able to . . .
- add two 3-digit numbers without regrouping (exchange) and check (A)
- compute addition examples having sums to $9.99 without regrouping (exchange) and check (A)
- solve word problems related to skills learned in this module (A)

3.02.03 **Addition of 3-digit numbers with one regrouping (exchange) ones to tens**
The student will be able to . . .
- add two 3-digit numbers with one regrouping (exchange) ones to tens and check (A)
- solve word problems related to skills learned in this module (A)

3.02.04 **Addition of 2- and 3-digit numbers with one regrouping (exchange) tens to hundreds**
The student will be able to . . .
- add two 2-digit numbers with regrouping (exchange) tens to hundreds and check (A)
- add two 3-digit numbers with regrouping (exchange) tens to hundreds and check (A)
- solve word problems related to skills learned in this module (A)

3.02.05 **Addition of 3-digit numbers with two regroupings (exchanges) ones to tens, tens to hundreds**
The student will be able to . . .
- add two or more 3-digit numbers with two regroupings (exchanges), ones for tens, tens for hundreds and check (A)
- compute addition examples having sums to $9.99 with two regroupings (exchanges) and check (B)
- solve word problems related to skills learned in this module (A)

3.02.06 **Addition of 4-digit numbers**
The student will be able to . . .
- add two 4-digit numbers without regrouping (exchange) and check (B)
- add two 4-digit numbers with one regrouping (exchange) and check (B)
- add two 4-digit numbers with two regroupings (exchanges) and check (B)
- add two 4-digit numbers with three regroupings (exchanges) and check (B)
- rewrite a 4-digit horizontal addition example in vertical format with regrouping (exchange), add and check (B)
- solve word problems related to skills learned in this module (B)

4.02.01 **Addition of numbers through 4-digits**
The student will be able to . . .
- estimate sums by rounding addends to the largest place (A)
- add two or more addends in vertical or horizontal format with or without regrouping (exchange) and check (A)
- solve word problems related to skills learned in this module (A)

4.02.02 **Addition of 5-digit numbers with or without regrouping (exchange) in one or more places**

The student will be able to . . .

- add two or more 5-digit numbers and check (B)
- solve word problems related to skills learned in this module (B)

4.02.03 **Associative property of addition**

The student will be able to . . .

- use the associative property of addition (A)
- solve word problems related to skills learned in this module (A)

4.02.04 **Addition of 5- and 6-digit numbers with or without regrouping (exchange) in one or more places**

The student will be able to . . .

- add two or more 5-digit numbers and check (A)
- add two or more 6-digit numbers and check (A)
- solve word problems related to skills learned in this module (A)

5.02.01 **Addition of three or more numbers through 999,999**

The student will be able to . . .

- estimate by rounding addends to the largest possible place (B)
- add three or more addends and check (A)
- solve word problems related to skills learned in this module (A)

6.02.01 **Addition of two or more numbers through 9-digits**

The student will be able to . . .

- add three or more numbers through hundred million with regrouping and check (A)
- estimate by rounding addends to the largest possible place (A)
- solve word problems related to skills learned in this module (A)

7.02.01 **Addition of whole numbers**

The student will be able to . . .

- compute the sums of whole numbers and check (A)
- estimate by rounding addends to the largest possible place (A)
- solve verbal problems related to skills learned in this module (A)

SUBTRACTION OF WHOLE NUMBERS

Topic 03

0.03.01 **Subtraction**
The student will be able to . . .
- recognize that when an object(s) is subtracted from a group, the resulting group is smaller than the original
- solve oral problems related to subtraction skills using concrete materials

1.03.01 **Concept of subtraction**
The student will be able to . . .
- recognize that subtraction is the removal of members from a group (A)
- recognize that when a member is subtracted from a group, the resulting group is smaller than the original group (A)

1.03.02 **The minus (–) symbol**
The student will be able to . . .
- identify and write the minus (–) symbol (A)
- distinguish between the plus (+) and minus (–) symbols (A)
- demonstrate that subtract, minus and take away are synonymous (B)
- identify the minus (–) symbol in a number sentence using both vertical and horizontal formats (A)
- write the minus (–) symbol in a number sentence, using both vertical and horizontal formats (A)

1.03.03 **Subtraction facts through five**
The student will be able to . . .
- subtract numbers to obtain differences from 1 through 5, in both horizontal and vertical formats (A)
- write a subtraction sentence using both the horizontal and vertical formats for minuends through 5 (A)

1.03.04 **Number families through five**
The student will be able to . . .
- identify related addition and subtraction facts through five (A)
- choose operation symbols for facts having sums and differences through 5 (B)

1.03.05 **Subtraction facts through ten**
The student will be able to . . .
- subtract numbers to obtain differences from 1 through 10 (A)
- write a subtraction sentence using horizontal and vertical formats for minuends through 10 (A)

1.03.06 **Number families through ten**
The student will be able to . . .
- identify related addition and subtraction facts through ten (A)
- choose operation symbols for facts having sums and differences through 10 (A)

1.03.07 **Subtract a 1-digit number from 11 through 18**
The student will be able to . . .
- subtract a 1-digit number from 11 through 18 where the difference will be 2 through 9 (B)
- identify related addition and subtraction facts for each number family through 18 (A)
- check subtraction problems by using addition (A)
- solve story problems related to skills learned in this module (A)

1.03.08 **Subtract a 1-digit number from a 2-digit number without regrouping (exchange)**
The student will be able to . . .
- subtract a 1-digit number from a 2-digit number without regrouping (exchange) (A)
- check subtraction problems by using addition (A)
- solve story problems related to skills learned in this module (A)

1.03.09 **Subtraction of ten(s)**
The student will be able to . . .
- subtract 10 from multiples of 10 through 90 (A)
- subtract multiples of 10 through 90 (A)
- subtract 10 from any 2-digit number through 99 (A)
- subtract multiples of 10 from any 2-digit number through 99 (A)

1.03.10 **Subtract a 2-digit number from a 2-digit number without regrouping (exchange)**
The student will be able to . . .
- subtract a 2-digit number from a 2-digit number without regrouping (exchange) (A)
- check subtraction problems by using addition (A)
- solve story problems related to skills learned in this module (A)

2.03.01 **Subtraction of a 2-digit number from a 3-digit number without regrouping (exchange)**
The student will be able to . . .
- subtract a 2-digit number from a 3-digit number without regrouping (exchange) and check (B)
- subtract money using a 3-digit minuend and a 2-digit subtrahend and check (B)
- solve story problems related to skills learned in this module (B)

2.03.02 **Subtraction of a 3-digit number from a 3-digit number without regrouping (exchange)**
The student will be able to . . .
- subtract two 3-digit numbers without regrouping (exchange) and check (B)
- subtract money through $9.99 without regrouping (exchange) and check (B)
- solve story problems related to skills learned in this module (B)

2.03.03 **Subtraction of 2-digit and 3-digit numbers using expanded notation without regrouping (exchange)**
The student will be able to . . .
- subtract 2-digit numbers using expanded notation without regrouping (exchange) (A)
- subtract a 2-digit number from a 3-digit number using expanded notation without regrouping (exchange) (B)
- subtract a 3-digit number from a 3-digit number using expanded notation without regrouping (exchange) (B)

2.03.04 **Subtraction of a 1-digit number from a 2-digit number with regrouping (exchange)**
The student will be able to . . .
- subtract a 1-digit number from a 2-digit number with regrouping (exchange) using expanded notation (B)
- subtract a 1-digit number from a 2-digit number with regrouping (exchange) tens for ones and check (B)
- subtract money through 99¢ with regrouping (exchange) tens for ones and check (B)
- solve story problems related to skills learned in this module (B)

2.03.05 **Subtraction of 2-digit numbers with regrouping (exchange) tens to ones**
The student will be able to . . .
- subtract a 2-digit number from a 2-digit number with regrouping (exchange) using expanded notation (B)
- subtract a 2-digit number from a 2-digit number with regrouping (exchange) tens to ones and check (B)
- subtract money through 99¢ and check (B)
- solve story problems related to skills learned in this module (B)

2.03.06 **Properties of subtraction**
The student will be able to . . .
- recognize that the commutative property does not apply to subtraction (B)
- use a table to discover the inverse relationship between addition and subtraction (B)

3.03.01 **Subtraction of 3-digit numbers without regrouping (exchange)**
The student will be able to . . .
- subtract two 3-digit numbers without regrouping (exchange) and check (A)
- subtract money through $9.99 without regrouping (exchange) and check (A)
- solve word problems related to skills learned in this module (A)

3.03.02 **Subtraction of 2-digit numbers with regrouping (exchange) tens to ones**
The student will be able to . . .
- subtract a 2-digit number from a 2-digit number with regrouping (exchange) using expanded notation (A)
- subtract a 2-digit number from a 2-digit number with regrouping (exchange) tens to ones and check (A)
- subtract money through 99¢ and check (A)
- solve word problems related to skills learned in this module (A)

3.03.03 **Subtraction of 3-digit numbers with regrouping (exchange) tens to ones**
The student will be able to . . .
- subtract a 1-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check (A)
- subtract a 2-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check (A)
- subtract a 3-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check (B)
- solve word problems related to skills learned in this module (B)

3.03.04 **Subtraction of 3-digit numbers with one regrouping (exchange) hundreds to tens**
The student will be able to . . .
- subtraction 3-digit numbers with one regrouping (exchange) hundreds to tens and check (A)
- compute subtract examples with one regrouping (exchange) having minuends to $9.99 and check (B)
- solve word problems related to skills learned in this module (A)

3.03.05 **Subtraction of 3-digit numbers with two regroupings (exchanges) tens to ones and hundreds to tens**
The student will be able to . . .
- subtract 3-digit numbers with two regroupings (exchanges), tens to ones, hundreds to tens and check (A)
- compute subtraction examples with two regroupings (exchanges) having minuends to $9.99 and check (B)
- solve word problems related to skills learned in this module (A)

3.03.06 **Subtraction of 4-digit numbers**
The student will be able to . . .
- subtract two 4-digit numbers without regrouping (exchange) and check (B)
- subtract two 4-digit numbers with one regrouping (exchange) and check (B)
- subtract two 4-digit numbers with two regroupings (exchanges) and check (B)
- subtract two 4-digit numbers with three regroupings (exchanges) and check (B)
- compute subtraction examples having minuends with multiples of 100 or 1000 and check (B)
- solve word problems related to skills learned in this module (B)

4.03.01 **Subtraction of 4-digit numbers**
The student will be able to . . .
- estimate differences by rounding minuends and subtrahends to the nearest thousand (A)
- subtract two 4-digit numbers without regrouping (exchange) and check (A)
- subtract two 4-digit numbers with one or more regroupings (exchanges) and check (A)
- compute subtraction examples having minuends with multiples of 100 or 1000 and check (A)
- solve word problems related to skills learned in this module (A)

4.03.02 **Subtraction of 5-digit numbers with or without regrouping (exchange) in one or more places**
The student will be able to . . .
- subtract a 2-, 3-, 4- and 5-digit number from a 5-digit number and check (B)
- subtract a 2-, 3-, 4- and 5-digit number from 10,000 and multiples of 10,000 and check (B)
- solve word problems related to skills learned in this module (B)

4.03.03 **Subtraction of 5- and 6-digit numbers with or without regrouping (exchange) in one or more places**
The student will be able to . . .
- subtract a 2-, 3-, 4-, 5- or 6-digit number from a 5- or 6-digit number and check (A)
- subtract a 2-, 3-, 4-, 5- or 6-digit number from 10,000 and its multiples and 100,000 and its multiples and check (A)
- solve word problems related to skills learned in this module (A)

5.03.01 **Subtraction — minuends through 999,999**
The student will be able to . . .
- estimate the difference by rounding the minuend and subtrahend to the largest possible place (B)
- subtract 4-, 5-, and 6-digit numbers from 6-digit numbers and check (A)
- subtract a 4- or 5-digit number from 100,000 and its multiples and check (A)
- solve word problems related to skills learned in this module (A)

6.03.01 **Subtraction of large numbers**
The student will be able to . . .
- subtract large numbers with exchange in any column and check (A)
- solve word problems related to skills learned in this module (A)

7.03.01 **Subtraction of large numbers**
The student will be able to . . .
- subtract large numbers and check (A)
- estimate differences by rounding to the largest possible place (A)
- solve verbal problems related to skills learned in this module (A)

MULTIPLICATION OF WHOLE NUMBERS

Topic 04

2.04.01 **Multiplication facts for twos through 10**
The student will be able to . . .
- show groups of two through 5 groups of two (A)
- count by twos through 10 (A)
- demonstrate that multiplication is the process of repeated addition of like addends (A)
- use a number line to demonstrate counting by twos through 10 (A)
- recognize × as the symbol for multiplication (A)

2.04.02 **Multiplication facts for fives through 25**
The student will be able to . . .
- show groups of five through 25 (A)
- count by fives through 25 (A)
- use a number line to demonstrate counting by fives (A)
- demonstrate that multiplication is the process of repeated addition of like addends (A)

2.04.03 **Multiplication facts for threes through 15**
The student will be able to . . .
- show groups of three through 5 groups of three (A)
- count by threes through 15 (A)
- use a number line to demonstrate counting by threes (A)
- demonstrate that multiplication is the process of repeated addition of like addends (A)

2.04.04 **Multiplication facts for fours through 20**
The student will be able to . . .
- show groups of four through 5 groups of four (A)
- count by fours through 20 (A)
- use a number line to demonstrate counting by fours through 20 (A)
- demonstrate that multiplication is the process of repeated addition of like addends (A)

2.04.05 **Commutative property of multiplication**
The student will be able to . . .
- apply the commutative property of multiplication to the two times table through 5 groups of two (A)
- apply the commutative property of multiplication to the three times table through 5 groups of three (A)
- apply the commutative property of multiplication to the four times table through 5 groups of four (B)

3.04.01 **Multiplication facts**
The student will be able to . . .
- write multiplication facts for numbers 1 through 5 in horizontal and vertical formats (A)
- state multiplication facts by filling in the blanks in a multiplication table (A)
- use the commutative property of multiplication (A)

3.04.02 **The identity element (1) for multiplication and the role of zero**
The student will be able to . . .
- recognize one (1) as the identity element in multiplication (A)
- find the product when zero (0) is a factor (A)

3.04.03 **Multiplication of twos**
The student will be able to . . .
- multiply two (2) by the numbers one (1) through nine (9) using vertical and horizontal formats (A)
- apply the commutative property of multiplication to the two times table (A)
- solve word problems related to skills learned in this module (A)

3.04.04 **Multiplication of fives**
The student will be able to . . .
- multiply five (5) by the numbers one (1) through nine (9) using vertical and horizontal formats (A)
- apply the commutative property of multiplication to the five times table (A)
- solve word problems related to skills learned in this module (A)

40

3.04.05 **Multiplication of threes and fours**
The student will be able to . . .
- multiply three (3) by the numbers one (1) through nine (9), using vertical and horizontal formats (A)
- multiply four (4) by the numbers one (1) through nine (9), using vertical and horizontal formats (A)
- apply the commutative property of multiplication to the 3 and 4 times tables (A)
- solve word problems related to skills learned in this module (A)

3.04.06 **Multiplication of sixes and sevens**
The student will be able to . . .
- multiply six (6) by the numbers one (1) through (9) using vertical and horizontal formats (A)
- multiply seven (7) by the numbers one (1) through (9) using vertical and horizontal formats (A)
- apply the commutative property of multiplication to the six (6) and seven (7) times table (A)
- solve word problems related to skills learned in this module (A)

3.04.07 **Multiplication of eights and nines**
The student will be able to . . .
- multiply eight (8) by the numbers one (1) through (9) using vertical and horizontal formats (A)
- multiply nine (9) by the numbers one (1) through (9) using vertical and horizontal formats (A)
- apply the commutative property of multiplication to the eight and nine times tables (A)
- solve word problems related to skills learned in this module (A)

3.04.08 **Multiplication of tens**
The student will be able to . . .
- multiply ten (10) by the numbers one (1) through (9) using vertical and horizontal formats (A)
- apply the commutative property of multiplication to the ten times table (A)
- apply the associative property of multiplication to the ten times table (A)
- use the distributive property of multiplication over addition with multiples of ten which are less than 100, by 2 through 9 (B)
- multiply multiples of ten by 2 through 9 (B)

3.04.09 **Patterns in multiplication tables through 10 × 10**
The student will be able to . . .
- fill in a multiplication table from 0 × 0 through 10 × 10 (A)
- find patterns in multiplication tables from 0 × 0 through 10 × 10 (A)

3.04.10 **Multipication of 2- and 3-digit numbers by a 1-digit multiplier without regrouping (exchange)**
The student will be able to . . .
- multiply multiples of 100 by a 1-digit number without regrouping (exchange) (B)
- multiply 2- and 3-digit numbers by numbers less than 10 in vertical and horizontal formats without regrouping (exchange) (B)
- solve word problems related to skills learned in this module (B)

3.04.11 **Multiplication through 3-digit numbers by a 1-digit multiplier with regrouping (exchange)**
The student will be able to . . .
- multiply a 2- or 3-digit number dy a 1-digit number with regrouping (exchange) using the partial product method (B)
- multiply a 2- or 3-digit number by a 1-digit number with regrouping (exchange) using the short multiplication algorithm (B)
- solve word problems related to skills learned in this module (B)

4.04.01 **Basic multiplication facts for 11 and 12 through 144**
The student will be able to . . .
- recognize the basic multiplication facts for 11 and 12 through 144 (A)
- solve word problems related to skills learned in this module (A)

4.04.02 **Multiplication of 2- and 3-digit numbers by a 1-digit number**
The student will be able to . . .
- multiply 10 and 100 by a 1-digit number (A)
- multiply multiples of 10 and 100 by a 1-digit number (A)
- use the distributive property of multiplication over addition (A)
- multiply 2- and 3-digit numbers by a 1-digit number without regrouping (exchange) (A)
- multiply 2- and 3-digit numbers by a 1-digit number with regrouping (exchange) (A)
- solve word problems related to skills learned in this module (A)

4.04.03 **Multiplication of money values**
The student will be able to . . .
- round values to the nearest dollar to estimate products (A)
- multiply values to $.99 by a 1-digit multiplier (A)
- multiply values to $9.99 by a 1-digit multiplier (A)
- solve word problems related to skills learned in this module (A)

4.04.04 **Multiplication of 4- and 5-digit numbers by a 1-digit number**
The student will be able to . . .
- multiply 1,000 and 10,000, and multiples of 1,000 and 10,000, by a 1-digit number (A)
- multiply 4-digit numbers by a 1-digit number without regrouping (exchange) (A)
- multiply 4-digit numbers by a 1-digit number with regrouping (exchange) (A)
- solve word problems related to skills learned in this module (A)

4.04.05 **Multiplication of 2-digit numbers**
The student will be able to . . .
- multiply 10, and multiples of 10, by 10 and multiples of 10 (A)
- multiply any 2-digit number by 10 and multiples of 10 (A)
- multiply a 2-digit number by a 2-digit number without regrouping (exchange) (A)
- multiply a 2-digit number by a 2-digit number with regrouping (exchange) (A)
- solve word problems related to skills learned in this module (A)

4.04.06 **Multiplication of a 3-digit number by a 2-digit number**
The student will be able to . . .
- multiply 100, and multiples of 100, by 10 and multiples of 10 (A)
- multiply any 3-digit number by 10 and multiples of 10 (A)
- multiply a 3-digit number by a 2-digit number (A)
- solve word problems related to skills learned in this module (A)

5.04.01 **Multiplication of 4-digit numbers by 2-digit numbers**
The student will be able to . . .
- multiply multiples of 1,000 by multiples of ten (A)
- round factors to estimate products (A)
- use the distributive property of multiplication to multiply a 4-digit number by a 2-digit number (B)
- multiply a 4-digit number by a 2-digit number in vertical format (A)
- solve word problems related to skills learned in this module (A)

5.04.02 **Multiplication of 3-digit numbers by 3-digit numbers**
The student will be able to . . .
- multiply multiples of 100 by multiples of 100 (A)
- estimate products by rounding factors (A)
- multiply a 3-digit number by a 3-digit number (A)
- solve word problems related to skills learned in this module (A)

5.04.03 **Multiplication of 4-digit numbers by 3-digit numbers**
The student will be able to . . .
- multiply multiples of 1000 by multiples of 100 (B)
- estimate products by rounding factors (B)
- multiply a 4-digit number by a 3-digit number (B)
- solve word problems related to skills learned in this module (B)

6.04.01 **Multiplication by 4- or more digit numbers**
The student will be able to . . .
- multiply a 4- or more digit number by a 4- or more digit number in vertical format (A)
- solve word problems related to skills learned in this module (A)

7.04.01 **Multiplication of large numbers**
The student will be able to . . .
- compute the product of a 1-digit, 2-digit and a 3-digit multiplier (A)
- compute the product of a whole number multiplied by powers of ten (A)
- apply the properties of multiplication: commutativity, associativity, distributivity (multiplication over addition), multiplicative property of zero, and the identity element (A)

8.04.01 **Multiplication of powers with a common base**
The student will be able to . . .
- multiply powers of ten by adding the exponents (B)
- multiply powers with a common base (B)

DIVISION OF WHOLE NUMBERS

Topic 05

2.05.01 **Introduction to division**
The student will be able to . . .
- demonstrate that division is a process of sharing (B)
- demonstrate that division is the process of repeated subtraction (B)
- solve story problems related to skills learned in this module (B)

2.05.02 **Division facts for twos through 10**
The student will be able to . . .
- separate up to 10 objects into groups of two without a remainder (A)
- determine the number of groups of two that can be formed from an even numbered group of objects up to 10 (A)
- solve story problems related to skills learned in this module (A)

2.05.03 **Division facts for fives through 25**
The student will be able to . . .
- separate up to 25 objects into groups of five without a remainder (A)
- identify the number for a given group through 25 and tell how many groups of five are in that larger group (A)
- solve story problems related to skills learned in this module (A)

2.05.04 **Division facts for threes through 15**
The student will be able to . . .
- separate up to 15 objects into groups of three without a remainder (A)
- identify the number for a given group (through 15) and tell how many groups of three are in that group (B)
- solve story problems related to skills learned in this module (B)

2.05.05 **Division facts for fours through 20**
The student will be able to . . .
- separate up to 20 objects into groups of four, without a remainder (A)
- identify the number for a given set through 20 and tell how many groups of four are in that set (B)
- solve story problems related to skills learned in this module (B)

2.05.06 **Division and multiplication as inverse operations**
The student will be able to . . .
- recognize the division symbol (÷) (A)
- recognize that multiplication and division are inverse (opposite) operations (A)
- demonstrate related facts for number families (A)

3.05.01 **Concepts of division**
The student will be able to . . .
- demonstrate various ways to write a division example (A)
- name the dividend, the divisor and the quotient (A)
- demonstrate that the division process may be regarded as repeated subtraction of the same number (A)
- recognize that division and multiplication are inverse operations, that is, that dividing by a number is the inverse operation of multiplying by that number (A)

3.05.02 **Division of whole numbers for twos through 18, for fives through 45**
The student will be able to . . .
- divide by two for dividends through 18 without a remainder (A)
- divide by five for dividends through 45 without a remainder (A)
- recite the division facts for twos and fives (A)
- solve word problems related to skills learned in this module (A)

3.05.03 **Division of whole numbers for threes through 27, for fours through 36**
The student will be able to . . .
- divide by 3 for dividends up to 27 without a remainder (A)
- divide by 4 for dividends up to 36 without a remainder (A)
- solve word problems related to skills learned in this module (A)

3.05.04 **Division of whole numbers for sixes through 54, for sevens through 63**
The student will be able to . . .
- divide by 6 for dividends to 54 without a remainder (A)
- divide by 7 for dividends to 63 without a remainder (A)
- solve word problems related to skills learned in this module (A)

3.05.05 **Division of whole numbers for eights through 72, for nines through 81**
The student will be able to . . .
- divide by 8 for dividends to 72 without a remainder (A)
- divide by 9 for dividends to 81 without a remainder (A)
- solve word problems related to skills learned in this module (A)

3.05.06 **Division of 2- and 3-digit dividends by 1-digit divisors without regrouping (exchange)**
The student will be able to . . .
- divide a 2-digit dividen by a 1-digit divisor without regrouping (exchange) or a remainder (B)
- divide a 3-digit dividen by a 1-digit divisor without regrouping (exchange) or a remainder (B)
- solve word problems related to skills learned in this module (B)

3.05.07 **Division with remainders**
The student will be able to . . .
- recognize a remainder as that which is "left over" in division (B)
- solve word problems related to skills learned in this module (B)

4.05.01 **Properties of division**
The student will be able to . . .
- use one (1) as a divisor (A)
- recognize that using zero as the divisor is meaningless because the quotient will always be undefined (A)
- recognize that a dividend of zero divided by any non-zero number will always have a quotient of zero (A)

4.05.02 **Division of a 2- and 3-digit dividend by a 1-digit divisor without regrouping**
The student will be able to . . .
- recognize a remainder as that which is "left over" in division (A)
- estimate the quotients for division examples (A)
- divide a 2- or 3-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder and check (A)
- divide a 2- or 3-digit dividend by a 1-digit divisor without regrouping (exchange) with a remainder and check (A)
- solve word problems related to skills learned in this module (A)

4.05.03 **Division of a 2- and 3-digit dividend by a 1-digit divisor with regrouping**
The student will be able to . . .
- divide a 2- or 3-digit dividend by a 1-digit divisor regrouping tens as ones with or without a remainder and check (A)
- divide a 3-digit dividend by a 1-digit divisor regrouping hundreds as tens with or without a remainder and check (A)
- use zero as a placeholder in a quotient (A)
- solve word problems using skills learned in this module (A)

4.05.04 **The distributive property of division**
The student will be able to . . .
- identify the distributive property of division over addition or subtraction and express the remainder as a fraction (B)
- divide a 2- or 3-digit number by a 1-digit divisor without regrouping using the distributive property of division over addition (B)

4.05.05 **Division of money values**
The student will be able to . . .
- round to the nearest dollar to estimate quotients (A)
- divide values to $.99 by a 1-digit divisor and check (A)
- divide values to $9.99 by a 1-digit divisor and check (A)
- solve word problems related to skills learned in this module (A)

4.05.06 **Division of 4-digit dividends by a 1-digit divisor**
The student will be able to . . .
- divide a number through 9,999 by a 1-digit divisor and check using multiplication (B)
- solve word problems related to skills learned in this module (B)

4.05.07 **Division of 2- and 3-digit dividends by multiples of 10 as divisors**
The student will be able to . . .
- divide a 2-digit dividend by a 10 or a multiple of 10 and check (A)
- divide a 3-digit dividend by a 10 or a multiple of 10 and check (A)
- solve word problems related to skills learned in this module (A)

4.05.08 **Division of 2- and 3-digit dividends by 2-digit divisors**
The student will be able to . . .
- divide a 2-digit dividend by a 2-digit divisor and check (A)
- divide a 3-digit dividend by a 2-digit divisor and check (A)
- solve word problems related to skills learned in this module (A)

5.05.01 **Division of 4- and 5-digit dividends by 1-digit divisors**
The student will be able to . . .
- divide 4- and 5-digit dividends by a 1-digit divisor using the (one-sided) distributive property of division over addition and check (A)
- divide a 4-digit dividend by a 1-digit divisor and check (A)
- express a remainder as a fraction (B)
- divide a 5-digit dividend by a 1-digit divisor and check (A)
- solve word problems related to skills learned in this module (A)

5.05.02 **Division of 4- and 5-digit dividends by 2-digit divisors**
The student will be able to . . .
- estimate quotients (A)
- divide a 4-digit dividend by a 2-digit divisor and check (B)
- divide 5-digit dividends by 2-digit divisors and check (B)
- solve word problems related to skills learned in this module (B)

5.05.03 **Division of 4- and 5-digit dividends by 2-digit divisors**
The student will be able to . . .
- divide a 4-digit dividend by a 2-digit divisor and check (A)
- divide a 5-digit dividend by a 2-digit divisor and check (A)
- solve word problems related to skills learned in this module (A)

5.05.04 **Division by multiples of 100**
The student will be able to . . .
- divide a multiple of 1,000 or 10,000 by a multiple of 100 and check (B)
- divide a 4- or 5-digit dividend by a multiple of 100 and check (B)
- solve word problems related to skills learned in this module (B)

5.05.05 **Division by 3-digit divisors**
The student will be able to . . .
- estimate the quotient (B)
- divide a 4- or 5-digit number by a 3-digit divisor and check (B)
- solve word problems related to skills learned in this module (B)

6.05.01 **Division with large numbers**
The student will be able to . . .
- divide a dividend with a zero in any place and check (A)
- divide a dividend that is at least a 4-digit number by a 4-digit divisor and check (A)
- solve word problems related to skills learned in this module (A)

7.05.01 **Express a remainder as a fraction**
The student will be able to . . .
- express a remainder in a division example as a fraction (A)
- solve word problems related to skills learned in this module (A)

8.05.01 **Division of powers with a common base**
The student will be able to . . .
- divide powers of ten by subtracting the exponents (B)
- divide powers with a common base (B)

FRACTIONS

Topic 06

0.06.01 **A whole unit**
The student will be able to . . .
- identify an object as a unit when so considered
- identify a part of a whole
- distinguish part of a unit from the whole unit

0.06.02 **Share objects**
The student will be able to . . .
- recognize that when a group is separated into two parts of the same size, each part is 1/2 of the whole group
- solve oral story problems related to skills learned in this module

0.06.03 **Compare a half unit to a whole unit**
The student will be able to . . .
- recognize that a whole object is greater than one-half (1/2) of the object
- recognize that one-half (1/2) of an object is less than a whole

0.06.04 **The fraction one-half (1/2)**
The student will be able to . . .
- recognize equal parts of a whole
- recognize that when an object is separated into two (2) pieces of the same size, each piece is one-half (1/2) of the whole object
- divide representative objects into halves
- solve oral story problems related to skills learned in this module

1.06.01 **Halves**
The student will be able to . . .
- separate representative objects into halves (B)
- identify, write and record the symbol for one-half as 1/2, for two-halves as 2/2 (B)
- solve story problems related to skills learned in this module (B)

1.06.02 **Fourths**
The student will be able to . . .
- separate representative objects into fourths (B)
- identify and write fractional notation for one-fourth as 1/4, for two-fourths as 2/4, for three-fourths as 3/4, for four-fourths as 4/4 (B)
- identify 1/2 as equal to 2/4 pictorially, and record using the equal symbol (=) (B)
- solve story problems related to skills learned in this module (B)

1.06.03 **Thirds**
The student will be able to . . .
- separate representative objects into thirds (B)
- identify, write and record fractional notation for one-third as 1/3, for two-thirds as 2/3, for three-thirds as 3/3 (B)
- solve story problems related to skills learned in this module (B)

2.06.01 **Fractions — fifths, sixths, and tenths**
The student will be able to . . .
- recognize that when an object is separated into parts of equal size, each part may be written as a unit fraction of the whole object (A)
- separate a concrete object into fifths, sixths, and tenths and identify the parts as equal (A)
- identify and write fractional notation for fifths through 5/5, sixths through 6/6 and tenths through 10/10 (A)
- solve story problems related to skills learned in this module (A)

2.06.02 **Identify fractional parts of a group (1/2, 1/3, 1/4)**

The student will be able to . . .

- separate a group through 10 objects into two equal groups using fractional parts (A)
- separate a group through 20 objects into four equal groups using fractional parts (A)
- separate a group through 15 objects into three equal groups using fractional parts (A)
- solve story problems related to skills learned in this module (A)

3.06.01 **Equivalent fractions**

The student will be able to . . .

- identify and define the numerator and denominator in a given fraction (A)
- identify and record the total number of parts to equal one whole (halves, thirds, fourths, sixths and eighths) (A)
- compare and order like fractions (A)
- compare and order unlike unit fractions (A)

3.06.02 **Non-unit fractional parts of a group**

The student will be able to...

- separate a number of objects into non-unit fractional parts (B)
- solve word problems related to skills learned in this module (B)

3.06.03 **Addition and subtraction of fractions with like denominators**

The student will be able to . . .

- add fractions having like denominators in vertical and horizontal formats (B)
- subtract fractions having like denominators in horizontal and vertical formats (B)
- solve story problems related to skills learned in this module (B)

3.06.04 **Improper fractions and mixed numbers**

The student will be able to . . .

- define and identify an improper fraction (B)
- define and identify a mixed number (B)
- change an improper fraction to a mixed number or a whole number (B)
- change a mixed number or a whole number to an improper fraction (B)

3.06.05 **Ratio**

The student will be able to . . .

- write a ratio to represent a relationship between two quantities (B)
- solve word problems related to skills learned in this module (B)

4.06.01 **Addition and subtraction of fractions with common denominators**

The student will be able to . . .

- add fractions with common denominators (A)
- subtract fractions with common denominators (A)
- solve word problems related to skills learned in this module (A)

4.06.02 **Multiplication of fractions**

The student will be able to . . .

- multiply fractions having values less than 1 (B)
- rename any whole number as a fraction with a denominator of 1 (B)
- multiply a whole number by a fraction (B)

4.06.03 **Equivalent fractions**

The student will be able to . . .

- recognize equivalent fractions (A)
- match a set of equivalent fractions with its corresponding points on the number line (A)
- use the multiplication identity to generate equivalent fractions (B)

4.06.04 **Order of unit fractions**
The student will be able to . . .
- order numerically 3 unit fractions from least to greatest or greatest to least (A)
- solve word problems related to skills learned in this module (A)

4.06.05 **Improper fractions and mixed numbers**
The student will be able to . . .
- identify and define improper fractions and mixed numbers (A)
- change an improper fraction to a mixed number or a whole number (B)
- change a mixed number or a whole number to an improper fraction (B)

4.06.06 **Addition and subtraction of mixed numbers with common denominators**
The student will be able to . . .
- add mixed numbers with common denominators (B)
- subtract mixed numbers with common denominators (B)
- solve word problems related to skills learned in this module (B)

4.06.07 **Common factors**
The student will be able to . . .
- find the common factors of two or more whole numbers less than 100 (B)
- find the greatest common factor of a set of whole numbers (B)
- find the common multiples of two or more whole numbers less than 100 (B)
- find the least common multiple of a set of whole numbers (B)

4.06.08 **Addition and subtraction of fractions with unlike denominators**
The student will be able to . . .
- find equivalent fractions with a common denominator (B)
- add fractions having unlike denominators (B)
- subtract fractions having unlike denominators (B)
- solve word problems related to skills learned in this module (B)

4.06.09 **Ratio**
The student will be able to . . .
- write a ratio to represent a relationship between two quantities (A)
- solve word problems related to skills learned in this module (A)

5.06.01 **Equivalent fractions**
The student will be able to . . .
- use the equal multiplication property to generate equivalent fractions (A)
- rename fractions as simpler equivalent fractions in lower terms by dividing the numerator and the denominator by the same number (A)
- express fractions in simplest form (lowest terms) (B)
- arrange a set of fractions from the least to the greatest (B)

5.06.02 **Improper fractions and mixed numerals**
The student will be able to . . .
- change an improper fraction to a mixed numeral of a whole number (A)
- change a mixed numeral or a whole number to an improper fraction (A)

5.06.03 **Multiplication of fractions**

The student will be able to . . .

- multiply a whole number by a number expressed as a fraction and rename it in lowest (simplest) terms (A)
- find a fractional part of a whole number by creating equal parts (given a fraction whose denominator is a divisor of the whole number) (A)
- explain that the product of any unit fraction (fraction having a numerator of one) and a whole number can be interpreted as finding that fractional part of the number; and find such products when the whole number is a multiple of the denominator of the fraction (A)
- multiply a unit fraction by a second fraction by extending the understanding of taking a fractional part (B)
- multiply **any** two fractions less than one by extending the understanding of taking a fractional part (B)
- make a picture or other graphic illustration to demonstrate multiplication of fractions less than one (A)
- multiply with fractions having values less than one by taking products of numerators and denominators (B)
- create and solve word problems related to skills learned in this module (B)

5.06.04 **Greatest common factor**

The student will be able to . . .

- find the greatest common factor (GCF) of two or more numbers (A)
- rename fractions in **lowest** terms using the GCF (A)
- express computational results in lowest terms (A)

5.06.05 **Addition and subtraction of mixed numbers with common denominators**

The student will be able to . . .

- add mixed numbers with common denominators and express the sum in lowest terms (A)
- subtract mixed numbers with common denominators and express the difference in lowest terms (A)
- subtract mixed numbers with common denominators with regrouping (exchange) and express the difference in lowest terms (A)
- solve word problems related to skills learned in this module (A)

5.06.06 **Least common multiple**

The student will be able to . . .

- find the least common multiple (LCM) of two or more numbers (A)
- rename two or more fractions as fractions with common denominators (A)

5.06.07 **Addition and subtraction of fractions with unlike denominators**

The student will be able to . . .

- add fractions with unlike denominators and express the sum in lowest terms (A)
- subtract fractions with unlike denominators and express the difference in lowest terms (A)
- solve word problems related to skills learned in this module (A)

5.06.08 **Addition and subtraction of mixed numerals with unlike denominators**
The student will be able to . . .
- add mixed numerals with unlike denominators and express the sum in lowest terms (B)
- subtract mixed numerals with unlike denominators and express the difference in lowest terms (B)
- solve problems related to skills learned in this module (B)

5.06.09 **Multiplication with mixed numerals**
The student will be able to . . .
- multiply a whole number by a mixed numeral and express the product in simplest terms (A)
- multiply two mixed numerals and express the product in simplest terms (B)
- solve word problems related to skills learned in this module (A)

5.06.10 **Division of a whole number by a fraction**
The student will be able to . . .
- divide a whole number by a fraction using representative materials (A)
- divide a whole number by a fraction by renaming the whole number as a fraction with the same denominator (B)
- create and solve word problems related to skills learned in this module (B)

6.06.01 **Factor primes**
The student will be able to . . .
- rename even numbers greater than 2 as the sum of two primes (B)
- rename composite numbers as the product of primes (A)
- use prime factorization to find the greatest common factor (A)

6.06.02 **Estimation with fractions**
The student will be able to . . .
- estimate the result of addition and subtraction of fractions before computation (A)
- solve word problems related to skills learned in this module (A)

6.06.03 **Subtraction of fractions**
The student will be able to . . .
- subtract a mixed number from a whole number with simplification (A)
- subtract fractions having unlike denominators with simplification (A)
- check solutions using the principle of related operations (B)
- solve word problems related to skills learned in this module (A)

6.06.04 **Ratio**
The student will be able to . . .
- compare two numbers by naming the ratio of one to another and write them as a fraction (A)
- write equivalent ratios for a given ratio (A)

6.06.05 **Properties of multiplication with fractions**
The student will be able to . . .
- recognize that the commutative property of multiplication can be applied to multiplication of fractions (A)
- recognize that the distributive property of multiplication can be applied to multiplication of fractional numbers (A)
- estimate and compute the result of multiplication of fractions and mixed numbers (B)
- solve word problems related to skills learned in this module (A)

6.06.06 **Division of fractions**
The student will be able to . . .
- estimate the result of division of fractions before computation (A)
- divide a fraction by a fraction (A)

6.06.07 **Division of mixed numbers**
The student will be able to . . .
- divide a mixed number by a fraction (A)
- divide a mixed number by a mixed number (A)
- solve word problems related to skills learned in this module (A)

7.06.01 **Advanced fraction computations and concepts**
The student will be able to . . .
- find the average of two or more fractions (C)
- raise a fraction to an indicated power (C)

7.06.02 **Division with fractions**
The student will be able to . . .
- compute the quotient of two fractions using the algorithm:
$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{a \times d}{b \times c} \quad \text{(A)}$$
- solve verbal problems related to skills learned in this module (A)

7.06.03 **Ratio and proportion**
The student will be able to . . .
- compare two numbers by naming the ratio of one to another (A)
- write equivalent ratios for a given ratio (A)
- identify a proportion as a statement of equality between two ratios (A)
- identify means and extremes in a proportion (A)
- determine if two ratios form a true proportion (A)
- solve verbal problems related to skills learned in this module (A)

7.06.04 **Meaning of percent**
The student will be able to . . .
- convert a fraction whose denominator is a factor of 100 to a decimal and a percent (A)
- convert a mixed number to a decimal and a percent (A)
- convert a whole number percent to decimal fraction (A)

7.06.05 **Verbal problems involving percent**
The student will be able to . . .
- solve a verbal problem to find the amount of discount (A)
- solve a verbal problem to find the amount of sales tax (A)
- solve a verbal problem to find simple interest (Interest = Principal × Rate × Time) (A)

8.06.01 **Properties of fractions**
The student will be able to . . .
- use the commutative and associative properties of addition with fractions (A)
- use the commutative and associative properties of multiplication with fractions (A)
- recognize the additive identity property and the additive identity element 0 (A)
- recognize the multiplicative identity property and the multiplicative identity element 1 (A)
- recognize the additive inverse property and the additive inverse of a fraction (A)
- recognize the multiplicative inverse property and the multiplicative inverse element of a fraction (A)
- use the distributive property of multiplication over addition with fractions (A)

8.06.02 **Positive and negative fractions**

The student will be able to . . .

- find negative and positive fractions on a number line (A)
- determine that $-\frac{a}{b}$ is equivalent to $-a/b$ and $a/-b$ (A)
- compare two fractions and/or two mixed numbers using $>$, $<$ and $=$ (B)
- order a set of fractions (B)

8.06.03 **Proportions**

The student will be able to . . .

- solve a verbal problem with proportions and price rates (A)
- solve a verbal problem involving proportion and rate, time and distance (A)
- solve verbal problems involving proportion and scale drawings (A)
- solve a verbal problem involving proportions (A)

8.06.04 **Percents**

The student will be able to . . .

- convert a mixed number or decimal to a percent greater than 100% (A)
- convert a percent greater than 100% to a mixed number or decimal (A)
- convert a decimal to a percent less than 1% (A)
- convert a percent less than 1% to a decimal (A)
- recognize common fraction/decimal equivalents (A)

8.06.05 **Using percents to solve problems**

The student will be able to . . .

- use percents to solve verbal problems involving compound interest (A)
- use percents to solve a problem found in a newspaper (A)

DECIMALS

Topic 07

3.07.01 **Decimals**
The student will be able to . . .
- identify and read a decimal (B)
- write tenths as decimals (B)
- count by tenths (B)

3.07.02 **Addition and subtraction of decimals to tenths**
The student will be able to . . .
- add decimals in horizontal and vertical formats without regrouping (exchange) (B)
- subtract decimals in horizontal and vertical formats without regrouping (exchange) (B)
- solve word problems related to skills learned in this module (B)

4.07.01 **Decimals to hundredths**
The student will be able to . . .
- identify and read a decimal (A)
- write tenths as decimals (A)
- count by tenths (A)
- write any fraction with a denominator of 100 as a decimal (A)
- identify the place value of digits in decimals through hundredths (A)

4.07.02 **Order decimals**
The student will be able to . . .
- compare and order two or more decimals using the relation symbols < (less than), > (greater than), = (equal to) (A)
- recognize equivalency of decimals in tenths and hundredths (A)

4.07.03 **Addition and subtraction of decimals to hundredths**
The student will be able to . . .
- add decimals to hundredths (A)
- subtract decimals to hundredths (A)
- solve word problems related to skills learned in this module (A)

4.07.04 **Multiplication and division of decimals to tenths**
The student will be able to . . .
- multiply decimals to tenths with products to hundredths (A)
- divide decimals with dividends to tenths by whole number divisors (A)
- solve word problems related to skills learned in this module (A)

5.07.01 **Decimals—thousandths**
The student will be able to . . .
- identify the place value of decimals through thousandths (A)
- write tenths, hundredths, and thousandths as decimals (A)
- compare decimals expressed as tenths, hundredths, and thousandths, using the symbols >, <, = (B)

5.07.02 **Rounding decimals**
The student will be able to . . .
- round decimals to the nearest whole number (A)
- round decimals to the nearest tenth (B)
- round decimals to the nearest hundredth (B)

5.07.03 **Addition and subtraction with decimals through thousandths**
The student will be able to . . .
- estimate sums and differences by rounding the nearest whole number (A)
- add and subtract with decimals through thousandths and check (A)
- solve word problems related to skills learned in this module (A)

5.07.04 **Multiplication with decimals**
The student will be able to . . .
- multiply decimals by 10 and 100 (A)
- multiply decimals (yielding products no smaller than one thousandth) (A)
- solve word problems related to skills learned in this module (A)

5.07.05 **Division with decimals**
The student will be able to . . .
- divide a dividend expressed as a decimal by a whole number divisor and check (A)
- divide decimals by 10 and 100 (A)
- use the multiplicative identity (1) to express a quotient of decimals as an equivalent division by a whole number (B)
- divide a dividend expressed as a decimal by a divisor expressed as a decimal by solving an equivalent problem involving division by a whole number (B)
- solve problems related to skills learned in this module (A)

6.07.01 **Decimal notation**
The student will be able to . . .
- change fractions with denominators that are factors of multiples of ten to equivalent decimals (1/2, 1/5, 1/4, 1/20, 1/25, 1/50, etc.) (A)
- write any proper fraction or mixed numeral with a denominator of 1000 as a decimal fraction (A)
- change fractions with denominators unrelated to multiples of ten, to equivalent decimals (1/3, 1/8, 1/6, etc.) (A)

6.07.02 **Compare numbers in decimal notation**
The student will be able to . . .
- compare a given decimal by hundredths or thousandths (A)
- solve word problems related to skills learned in this module (A)

6.07.03 **Round decimals**
The student will be able to . . .
- round decimals in hundredths to the nearest tenth (A)
- round decimals in thousandths to the nearest hundredth (A)

6.07.04 **Percent**
The student will be able to . . .
- write a percent as a decimal (A)
- express fractions and decimals as an equivalent percent (A)
- solve word problems related to skills learned in this module (A)

6.07.05 **Add numbers in decimal form**
The student will be able to . . .
- add decimals through ten thousandths and check (A)
- solve word problems related to skills learned in this module (A)

6.07.06 **Subtract numbers in decimal form**
The student will be able to . . .
- subtract decimals through ten thousandths and check (A)
- solve word problems related to skills learned in this module (A)

6.07.07 **Multiplication of decimals**
The student will be able to . . .
- multiply a decimal by 10, 100 or 1000 (A)
- multiply a whole number by a decimal (A)
- multiply a decimal by a decimal (A)
- solve word problems related to skills learned in this module (A)

6.07.08 **Division of decimals**
The student will be able to . . .
- divide decimals by a whole number (A)
- divide decimals by a decimal fraction (A)
- solve word problems related to skills learned in this module (A)

7.07.01 **Decimal relationships**
The student will be able to . . .
- extend the base ten place value chart to include decimals whose denominators are powers of 10, and read and write decimal fractions in numerical and word form (A)
- identify equivalent decimals (A)
- compare and order decimals (A)
- round off a given decimal to a specified place (A)
- solve word problems related to skills learned in this module (A)

7.07.02 **Addition of decimals**
The student will be able to . . .
- compute the sum of two or more decimals arranged horizontally (A)
- solve word problems related to skills learned in this module (A)

7.07.03 **Subtraction of decimals**
The student will be able to . . .
- compute the difference of two decimals arranged vertically with the minuend having fewer decimal places than the subtrahend (A)
- solve word problems related to skills learned in this module (A)

7.07.04 **Multiplication of decimals**
The student will be able to . . .
- determine and place the decimal point in the product of a given multiplication example if the digits of the product are given (A)
- solve word problems related to skills learned in this module (A)

7.07.05 **Division of decimals**
The student will be able to . . .
- compute the quotient by correctly placing the decimal point given a division example in which the divisor is a power of 10 (A)
- compute the quotient to a specified decimal place given a division example in which the divisor is a whole number or a decimal (A)
- solve word problems related to skills learned in this module (A)

7.07.06 **Convert to decimals or fractions**
The student will be able to . . .
- convert a fraction to a terminating or non-terminating (repeating) decimal,fraction (A)
- convert a terminating or non-terminating (repeating) decimal to a fraction (A)

8.07.01 **Scientific notation**
The student will be able to . . .
- write a standard base ten numeral in scientific notation (B)
- write a number expressed in scientific notation as a standard base ten numeral (B)
- multiply two numbers expressed in scientific notation (B)
- divide two numbers expressed in scientific notation (B)

8.07.02 **Rational numbers/terminating decimals**
The student will be able to . . .
- redefine a terminating decimal as a repeating decimal with a "0 repetend" (A)
- define every rational number as a repeating decimal (A)

8.07.03 **Irrational numbers**

The student will be able to . . .

- define an irrational number as a non-repeating, non-terminating decimal (A)
- distinguish between a rational and irrational number (A)
- approximate to the nearest tenth the square root of non-perfect squares (A)
- solve verbal/numerical problems related to skills learned in this module (A)

INTEGERS

Topic 08

4.08.01 **Integers**
The student will be able to . . .
- identify a positive number as a number which appears to the right of zero on a number line (A)
- identify a negative number as a number which appears to the left of zero on a number line (A)
- identify situations when negative and positive numbers may be used (A)
- solve word problems related to skills learned in this module (A)

5.08.01 **Positive and negative numbers**
The student will be able to . . .
- use positive and negative numbers to represent changes in quantity in real situations (A)
- use the number line to identify and compare positive and negative numbers (A)
- use the number line to add integers (C)

6.08.01 **Compare integers**
The student will be able to . . .
- identify +n as a positive number, –n as a negative number and (+n,–n) as a pair of opposites, assuming $n > 0$ (A)
- identify which is the larger or smaller integer given any two integers (A)
- order a group of integers in increasing or decreasing order (A)
- solve word problems related to skills learned in this module (A)

6.08.02 **Addition of integers**
The student will be able to . . .
- recognize that the sum of each negative integer and its opposite is 0 (B)
- compute the sum of two positive integers (B)
- compute the sum of two negative integers (B)
- compute the sum of one negative integer and one positive integer (B)
- solve word problems related to skills learned in this module (B)

7.08.01 **Subtraction of signed numbers**
The student will be able to . . .
- subtract positive and negative integers using the inverse operation of addition (A)
- subtract a negative integer from a negative integer using the inverse operation of addition (A)

7.08.02 **Multiplication of signed whole numbers**
The student will be able to . . .
- multiply a positive whole number by another positive whole number (A)
- multiply a negative whole number by a positive whole number (A)
- multiply a negative whole number by another negative whole number (A)

7.08.03 **Division of signed whole numbers**
The student will be able to . . .
- compute the quotient with a positive dividend and a positive divisor (B)
- compute the quotient with a positive dividend and a negative divisor (B)
- compute the quotient with a negative dividend and a positive divisor (B)
- compute the quotient with a negative dividend and a negative divisor (B)

8.08.01 **Properties of integers**

The student will be able to . . .

- use the commutative and associative properties of addition with integers (A)
- use the commutative and associative properties of multiplication with integers (A)
- recognize the additive identity property and the additive identify element 0 (A)
- recognize the multiplicative identity element 1 (A)
- recognize the additive inverse property and the additive inverse of an integer (A)
- recognize the multiplicative inverse property and the multiplicative inverse of an integer (A)
- use the distributive property of multiplication over addition with integers (A)

8.08.02 **Division of signed numbers**

The student will be able to . . .

- compute the quotient with a positive dividend and a positive divisor (A)
- compute the quotient with a positive dividend and a negative divisor (A)
- compute the quotient with a negative dividend and a positive divisor (A)
- compute the quotient with a negative dividend and a negative divisor (A)
- raise an integer to a given power (A)

8.08.03 **Roots/absolute value**

The student will be able to . . .

- find two square roots of a positive number (A)
- find the cube root of a number (B)
- define the absolute value of a number as the distance of its location on the number line from the origin (A)
- find the absolute value of a number (A)

GEOMETRY

Topic 09

0.09.01 **Identification—parts of three-dimensional shapes**
The student will be able to . . .
- identify three-dimensional shapes
- recognize faces, edges and corners of a three-dimensional shape

0.09.02 **Shapes around us**
The student will be able to . . .
- recognize and form a circle
- recognize and form a square
- recognize and form a rectangle
- recognize and form a triangle
- identify and form patterns

1.09.01 **Patterns**
The student will be able to . . .
- use attributes to classify objects by size, shape, or color (A)
- identify different patterns with one variable attribute by size, shape or color (A)

1.09.02 **Properties of figures and shapes**
The student will be able to . . .
- observe the likenesses and differences of shapes in the environment (A)
- discover some properties of 2-dimensional shapes (circles, squares, rectangles, and triangles) (A)
- discover some properties of 3-dimensional shapes (cubes, rectangular prisms, spheres, cylinders and pyramids (A)

1.09.03 **Line symmetry**
The student will be able to . . .
- recognize and create shapes that have a line of symmetry (B)
- discover whether or not a given line is a line of symmetry for a figure (halves) (C)

2.09.01 **Points, lines, line segments, and rays around us**
The student will be able to . . .
- recognize points around us (B)
- recognize lines around us (B)
- recognize line segments around us (B)
- recognize rays around us (B)

2.09.02 **Explore properties of a circle, square, rectangle, and triangle**
The student will be able to . . .
- recognize and list some properties of a circle (round, continuous side, no corners, a center) (A)
- recognize and list some properties of a square (four equal sides, four square corners) (B)
- recognize and list some properties of a rectangle (four sides, four square corners) (B)
- recognize and list some properties of a triangle (three sides, three corners (B)

2.09.03 **Symmetry**
The student will be able to . . .
- determine whether objects have lines of symmetry (A)
- find more than one line of symmetry (A)

2.09.04 **Attributes of three-dimensional objects**
The student will be able to . . .
- compare attributes such as size, shape, and weight of common three-dimensional objects (B)
- compare attributes such as texture, or properties such as sliding or rolling (C)
- recognize shapes that fit without gaps (C)

3.09.01 **Points and lines**
The student will be able to . . .
- recognize and name a point (A)
- identify and name a line (A)
- identify and name a line segment (A)
- identify and name a ray (A)

3.09.02 **Construction of plane figures**
The student will be able to . . .
- use a compass and/or a protractor to construct circles (B)
- use a ruler to construct rectangles and squares (B)
- use a ruler to construct triangles (B)

3.09.03 **Open and closed figures and curves**
The student will be able to . . .
- recognize open and closed curves (B)
- recognize simple closed curves and complex closed curves (B)

3.09.04 **Solid figures**
The student will be able to . . .
- define and identify a sphre, cube, cone and cylinder (A)
- identify the vertex, edge, line segment, angle, and face of a solid figure (A)

3.09.05 **Coordinate positions**
The student will be able to . . .
- give directions for getting from one place to another on a grid using horizontal and vertical paths (B)
- identify points on a grid by using ordered pairs (B)

3.09.06 **Polygons**
The student will be able to . . .
- recognize and define a polygon as a simple closed curve with line segments called sides (B)
- recognize and define a quadrilateral as a 4-sided polygon (B)
- define perimeter of a quadrilateral as the sum of the lengths of its sides (A)

4.09.01 **Solid geometric figures (space figures) and their properties**
The student will be able to . . .
- recognize and name various solid geometric figures (space figures) (A)
- identify solid geometric figures in the environment (A)
- identify and define faces, edges, angles, right angles, line segments, and vertices of solid geometric figures (A)

4.09.02 **Lines and properties of lines**
The student will be able to . . .
- identify intersecting lines as two lines having one and only one point in common (B)
- identify perpendicular lines as lines that form right angles (B)
- identify parallel lines as two lines that never intersect (B)

4.09.03 **Properties of a circle**
The student will be able to . . .
- identify a radius of a circle (B)
- identify the chords of a circle (B)
- identify a diameter of a circle and compare the diameter of a circle to other parts of a circle (B)

4.09.04 **Polygons**
The student will be able to . . .
- recognize and define a polygon (A)
- recognize polygons in the environment (B)
- recognize and define a diagonal of a polygon as a line segment joining any two nonconsecutive vertices (B)

4.09.05 **Parallelograms**
The student will be able to . . .
- define a parallelogram as a quadrilateral in which the opposite sides are parallel (B)
- define a square and a rectangle as parallelograms (B)
- recognize parallelograms in the environment (B)

4.09.06 **Symmetry**
The student will be able to . . .
- recognize lines of symmetry in geometric shapes (A)
- recognize lines of symmetry in objects other than geometric shapes (A)

4.09.07 **Coordinate geometry**
The student will be able to . . .
- locate positive and negative coordinates on a grid (A)
- use line segments to connect points (A)

4.09.08 **Geometric designs**
The student will be able to . . .
- construct geometric figures using straight-edge rulers, protractors, and compasses (B)
- use geometric figures to make designs and pictures (B)

5.09.01 **Planes**
The student will be able to . . .
- identify a plane as a flat surface which extends endlessly in all directions having the property that the line joining any two points of the plane lies entirely in the plane (A)
- identify intersecting planes (B)
- identify the intersections of planes and space figures (B)

5.09.02 **Angles**
The student will be able to . . .
- identify the parts of an angle (B)
- name angles using the angle symbol (B)

5.09.03 **Angle measurement**
The student will be able to . . .
- measure and construct right angles using a protractor (B)
- identify acute and obtuse angles (B)
- measure and construct acute and obtuse angles using a protractor (C)

5.09.04 **Circle concepts**
The student will be able to . . .
- identify a radius of a circle (A)
- identify a chord of a circle (A)
- identify a diameter of a circle (A)
- identify an arc of a circle (B)
- construct a circle using a compass (A)
- identify a central angle of a circle as an angle with its vertex at the center of the circle (A)

5.09.05 **Geometric constructions**
The student will be able to . . .
- construct triangles, rectangles, and squares using rulers and/or protractors (B)
- construct a rhombus, a parallelogram, and a trapezoid using a ruler and/or protractor (C)

5.09.06 **Congruent and similar figures**
The student will be able to . . .
- recognize congruent segments, angles and figures (B)
- recognize similar figures (B)
- construct congruent segments, angles, and figures using a ruler, protractor, and/or compass (C)
- construct similar figures using graph paper, ruler, protractor, compass (C)

5.09.07 **Ordered number pairs**
The student will be able to . . .
- name the coordinates of a given point on a four-quadrant grid (A)
- plot an ordered pair on a four-quadrant grid (A)
- find ordered pairs which satisfy simple equations with two variables and graph the results (B)

6.09.01 **Circles**
The student will be able to . . .
- identify and define terms relating to a circle (B)
- describe and measure central angles (B)
- construct angles given specific angular size in degrees using the protractor (A)

6.09.02 **Triangles and angles**
The student will be able to . . .
- classify triangles according to the length of their sides (A)
- find the sum of the angles of a triangle (A)
- classify triangles according to their angles (A)
- construct a triangle when given three line segments using a compass and a straight edge (A)

6.09.03 **Space geometry—planes**
The student will be able to . . .
- identify the three possible positions for two lines in space (B)
- identify the three possible positions for a line and a plane in space (B)

6.09.04 **Solid geometric shapes**
The student will be able to . . .
- compare plane figures with solid figures (A)
- recognize the differences between solid figures (A)
- recognize that any face of a rectangular or triangular prism may be called the base (A)
- compare triangular and rectangular prisms (A)

7.09.01 **Angle classification**
The student will be able to . . .
- name and define the different types of angles (A)
- define and identify adjacent, supplementary and complementary angles (A)

7.09.02 **Vertical angles**
The student will be able to . . .
- use the results of measurements to identify vertical and supplementary angles (A)
- use the generalization that when two lines intersect, vertical angles are equal (A)

7.09.03 **Triangles**
The student will be able to . . .
- solve numerical problems involving the angles of a triangle (A)
- determine that the sum of the lengths of any two sides of a triangle is greater than the length of the third side (A)
- solve verbal problems related to skills learned in this module (A)

7.09.04 **Circles**
The student will be able to . . .
- identify a diameter as the longest chord passing through the center of a circle (A)
- use the relationship between the radius and the diameter ($D = 2R$) (A)
- identify the circumference as the distance around the circle (A)
- state the definition of π as the ratio of the circumference of a circle to the diameter (A)
- state the decimal and fractional approximations for π (A)
- use the formula for circumference of a circle where the radius ($C = 2\pi r$) or the diameter ($C = \pi d$) is given (A)
- solve verbal problems related to skills learned in this module (A)

7.09.05 **Spatial figures**
The student will be able to . . .
- define a plane as being determined by (1) two intersecting or parallel lines, (2) three non-collinear points, or (3) a line and a point not on the line (B)
- identify and count the number of faces, edges, vertices and bases in a given rectangular prism or triangular prism (A)

7.09.06 **Parallel lines and their properties**
The student will be able to . . .
- identify a pair of parallel lines (A)
- determine pairs of alternate interior angles and corresponding angles formed by a transversal through parallel lines (B)
- apply the properties of parallel lines to numerical problems (B)

7.09.07 **Angles of a polygon**
The student will be able to . . .
- find the sum of the angle measures of a polygon (B)
- find the sum of the angles of any polygon in numerical problems (B)
- identify a regular polygon (equilateral and equiangular) (B)
- find each interior angle of a regular polygon in numerical problems (B)

8.09.01 **Angles of a polygon**
The student will be able to . . .
- find the sum of the angle measures of a polygon (A)
- find the sum of the angles of any polygon in numerical problems (A)
- identify a regular polygon (equilateral and equiangular) (A)
- find the measure of each interior angle of a regular polygon (A)

8.09.02 **Parallel lines**
The student will be able to . . .
- determine pairs of alternate interior angles formed by a transversal crossing parallel lines (A)
- determine pairs of corresponding angles formed by a transversal crossing parallel lines (A)
- apply the properties of parallel lines to numerical problems (A)

8.09.03 **Pythagorean relationship**
The student will be able to . . .
- know that the Pythagorean relationship is $a^2 + b^2 = c^2$ where a and b are the legs of a right triangle and c is the hypotenuse (A)
- determine if three given measurements can be the lengths of a right triangle (A)
- determine the length of a side of a right triangle given the rational lengths of the other two sides (A)
- solve verbal problems involving the Pythagorean relationship (A)

8.09.04 **Congruence and similarity**
The student will be able to . . .
- define congruence and recognize its symbol (A)
- name and find corresponding sides and angles of congruent triangles (A)
- construct congruent segments and angles by using a compass, protractor or ruler (A)
- recognize that two triangles are congruent by SSS $\cong$ SSS, SAS $\cong$ SAS, ASA $\cong$ ASA (A)
- define similarity and recognize its symbol (A)
- recognize that two triangles are similar if aaa $\cong$ aaa or aa $\cong$ aa (A)
- recognize corresponding sides and corresponding angles of similar triangles (A)
- recognize that corresponding sides of similar triangles are in proportion (A)
- determine the length of a side of a triangle given a similar triangle (A)

8.09.05 **Spatial figures**
The student will be able to . . .
- define a plane as being determined by (1) two intersecting or parallel lines, (2) three non-collinear points, or (3) a line and a point not on a line (A)
- identify geometric solids (A)

MEASUREMENT

Topic 10

0.10.01 **Nonstandard measurement**
The student will be able to . . .
- measure the length and/or height of objects using nonstandard units of measure
- measure the capacity of objects using nonstandard units of measure
- define and compare nonstandard measurements of weight

0.10.02 **Weight**
The student will be able to . . .
- distinguish between the concepts of heavy and light
- compare objects that weigh more or less and the same as

0.10.03 **Capacity of containers**
The student will be able to . . .
- identify containers that are full/empty, half full/half empty
- distinguish among more than, less than, and the same as

0.10.04 **Time of day**
The student will be able to . . .
- recognize times of the day—morning, noon, afternoon and night
- distinguish between before/after, day/night, and early/late

0.10.05 **Calendar**
The student will be able to . . .
- recognize that a calendar has the names of the months, days of the week, year and dates
- recognize the time relationship—yesterday, today and tomorrow
- name the holidays and seasons as they occur

0.10.06 **General temperature measurement terms**
The student will be able to . . .
- distinguish between the concepts of hot and cold
- distinguish between cooler than and hotter than
- distinguish between as cold as and as hot as

0.10.07 **Size concepts**
The student will be able to . . .
- distinguish among the degrees of size—large/larger/largest and small/smaller/smallest
- distinguish among the concepts of long/longer/longest and short/shorter/shortest

0.10.08 **Money: pennies**
The student will be able to . . .
- recognize and identify the value of the penny as 1 cent and the ¢ sign
- count and write the value through 4 cents or 4¢
- solve story problems related to skills learned in this module

0.10.09 **Instruments of measurement**
The student will be able to . . .
- recognize that a ruler is an instrument used to measure length
- recognize that a scale is an instrument used to measure weight (heavy/light)
- recognize that a thermometer is an instrument used to measure temperature (hot/cold)

0.10.10 **Time relationships**
The student will be able to . . .
- distinguish between it takes longer and less time than
- recognize as long as
- distinguish between older and younger
- solve oral story problems related to skills learned in this module

0.10.11 **Comparative size terms**
The student will be able to . . .
- distinguish between shorter than and as short as
- distinguish between longer than and as long as
- estimate which object is about as long as or as wide as
- recognize the terms farther and nearer when referring to distance

0.10.12 **Coins: nickel and dime**
The student will be able to . . .
- recognize and name a nickel
- recognize and name a dime
- discriminate among a penny, nickel and dime

0.10.13 **Money: quarters through dollar bill**
The student will be able to . . .
- recognize and name a quarter
- recognize and name a half dollar
- recognize and name a dollar bill

1.10.01 **Seasons of the year**
The student will be able to . . .
- name and sequence the seasons of the year (B)
- name the holidays as they occur (B)
- name the current season, the season that came before and the season that will soon follow (A)

1.10.02 **Days of the week**
The student will be able to . . .
- name and sequence the days of the week (A)
- identify what day of the week yesterday was, today is, and tomorrow will be (A)
- name the current date (A)
- solve story problems related to the skills learned in this module (B)

1.10.03 **Measure of length—nonstandard**
The student will be able to . . .
- measure length using nonstandard units (A)

1.10.04 **Measurement of weight—nonstandard**
The student will be able to . . .
- measure weight using nonstandard units (A)

1.10.05 **Size comparisons**
The student will be able to . . .
- distinguish and compare objects using the terms short/tall and short/long (A)
- distinguish and compare objects using the terms long, longer, and longest; short, shorter, and shortest and tall, taller, and tallest (A)
- distinguish and compare objects using the terms wide, wider, and widest and narrow, narrower, and narrowest (A)

1.10.06 **Capacity**
The student will be able to . . .
- compare capacity of various size containers (B)
- estimate the capacity of various size containers (B)

1.10.07 **Pennies and nickels**
The student will be able to . . .
- identify and recognize that one nickel is equivalent to the value of five pennies (A)
- solve story problems related to the skills learned in this module (A)

1.10.08 **Measure capacity**
The student will be able to . . .
- define and compare full, half full, and empty (A)
- recognize a liter (B)

1.10.09 **Temperature**
The student will be able to . . .
- read a thermometer using non-numerical expressions (A)
- identify the degrees for the freezing point (32°F) and the boiling point (212°F) of water on a Fahrenheit thermometer (B)

1.10.10 **Temperature—Celsius**
The student will be able to . . .
- identify the degrees for the freezing point (0°C) and the boiling point (100°C) of water on a Celsius thermometer (B)

1.10.11 **Time to the hour**
The student will be able to . . .
- identify the hour hand (short hand) and minute hand (long hand) of the clock (A)
- read time on a standard and digital clock on the hour (o'clock) (A)

1.10.12 **Standard measurement—customary**
The student will be able to . . .
- identify the inch, foot and yard as standard units of length (B)
- use rulers and measuring tapes to measure familiar objects to the nearest inch, foot and yard (B)
- identify ounce and pound as standard units of weight (B)
- determine the weight of objects to the nearest ounce, pound (B)

1.10.13 **Standard measurement—metric**
The student will be able to . . .
- identify the centimeter, decimeter and meter as standard units of length (B)
- use centimeter rulers, centimeter measuring tapes and meter sticks to measure familiar objects (B)
- identify the kilogram as a standard unit of weight (B)
- determine the weight of objects to the nearest kilogram (B)

1.10.14 **Time to the half-hour**
The student will be able to . . .
- identify time "past the hour" (B)
- identify time "before the hour" (B)
- read time on a standard and digital clock on the half-hour (B)

1.10.15 **Dimes**
The student will be able to . . .
- identify equivalent values of a dime using nickels and pennies (A)
- find the value of coins (pennies and nickels) having sums through 10¢ (A)
- find the difference using minuends through 10¢ (A)
- solve story problems related to the skills learned in this module (A)

1.10.16 **Quarters, half dollars, dollars**
The student will be able to . . .
- recognize and identify a quarter, half dollar and dollar bill (B)
- identify equivalent values of a quarter using dimes, nickels, and pennies (B)
- read money notation through $9.99 using the dollar sign and decimal point (B)

2.10.01 **Time—months and years**
The student will be able to . . .
- recite the months of the year in sequential order (A)
- state what last month was and what next month will be (A)
- identify the number of days in a month and in a year (B)
- read the month, day, and year from a calendar (A)
- identify the dates that are before and after a given date (B)

2.10.02 **Quarters, half-dollars**
The student will be able to . . .
- recognize and identify a quarter and a half-dollar (A)
- identify equivalent values of a quarter using dimes, nickels and pennies (A)
- identify equivalent values of a half-dollar using quarters, dimes, nickels and pennies (B)
- solve story problems related to the skills learned in this module (A)

2.10.03 **Money—dollars**

The student will be able to . . .

- identify the value of a dollar bill as 100¢ (A)
- show equivalent values of a dollar bill (B)
- write the decimal point and dollar sign to show one dollar symbolically (A)
- transpose a given amount from the word form using the dollar sign, decimal point, and numbers (C)

2.10.04 **Temperature—Celsius and Fahrenheit thermometers**

The student will be able to . . .

- explain the meaning of the word degree and identify its symbol (B)
- recognize and read a Fahrenheit thermometer to the nearest five degrees, ten degrees (B)
- identify the degree scale as shown on a Celsius thermometer and read to the nearest five degrees, ten degrees (B)

2.10.05 **Linear measurement—inch and foot**

The student will be able to . . .

- identify various standard tools of linear measurement (A)
- identify an inch on a ruler (A)
- measure objects less than a foot in length to the nearest inch and record using the symbol for inch (") (B)
- use the 12-inch ruler to measure a line segment (B)
- identify the relationships between inch and foot (B)
- measure objects to the nearest foot and record, using the symbol for feet (') (A)

2.10.06 **Money—make change through the value of a dollar**

The student will be able to . . .

- make change through the value of fifty cents (B)
- use combinations of coins to make change through the value of one dollar (B)

2.10.07 **Linear measurement—meter, decimeter, and centimeter**

The student will be able to . . .

- measure objects using a meter stick and its subdivisions (cm/dm) (A)
- recognize that 100 cm = 1 m (B)
- compare centimeters, decimeters, and meters using equivalent measures (B)
- solve story problems related to the skills learned in this module (A)

2.10.08 **Weight—ounce, pound**

The student will be able to . . .

- identify pounds and ounces as standard units of weight (A)
- estimate and weigh familiar objects using appropriate customary units (A)

2.10.09 **Weight—gram and kilogram**

The student will be able to . . .

- identify grams and kilograms as metric units of weight (A)
- estimate and weigh familiar objects using appropriate metric units (A)

2.10.10 **Linear measurement—half inch**

The student will be able to . . .

- identify 1/2 inch on the 12 inch ruler (C)
- measure and record the lengths of objects to the nearest 1/2 inch (C)
- measure and record the lengths of line segments to the nearest 1/2 inch (C)

2.10.11 **Dozen and half dozen**

The student will be able to . . .

- identify a group of twelve objects as a dozen and six objects as a half dozen (A)
- solve story problems related to the skills learned in this module (A)

2.10.12 **Time—quarter hour, minutes, and seconds**

The student will be able to . . .

- identify relationships between seconds and minutes, and minutes and hours (B)
- read and write time to the quarter hour from a standard and a digital clock (B)
- solve story problems related to the skills learned in this module (B)

2.10.13 **Cup, pint, quart**

The student will be able to . . .

- identify the relationships among cup, pint and quart (A)
- estimate and measure capacity using different customary units (A)

2.10.14 **Deciliter**

The student will be able to . . .

- identify relationships between a liter and a deciliter (C)
- estimate and measure capacity using different metric units (A)

3.10.01 **Days and dates on a calendar**

The student will be able to . . .

- relate days and dates from a given calendar date (A)
- identify number relationships among days, weeks, months and years (A)
- solve word problems related to the skills learned in this module (A)

3.10.02 **Measurement—time**

The student will be able to . . .

- identify relationships between seconds and minutes, and minutes and hours (A)
- read and write time in terms of quarter hours on standard and digital clocks (A)
- tell time by five minute intervals (B)
- tell time by minute intervals (before, to, of the hour) (B)
- tell and record the time using A.M. and P.M. (A)
- solve word problems related to the skills learned in this module (B)

3.10.03 **Temperature—Fahrenheit and Celsius thermometers**

The student will be able to . . .

- recognize and read a Fahrenheit thermometer to the nearest five degrees, ten degrees (A)
- recognize and read a Celsius thermometer to the nearest five degrees, ten degrees (A)

3.10.04 **Weight in customary units**

The student will be able to . . .

- weigh familiar objects to the nearest whole pound, 1/2 pound, and 1/4 pound (B)
- read various types of scales using customary units (A)

3.10.05 **Weight in metric units**

The student will be able to . . .

- identify equivalent metric units of weight (B)
- read various types of scales using metric units (A)

3.10.06 **Inch, foot, yard**

The student will be able to . . .

- measure objects less than a foot in length to the nearest inch and record using the symbol for inch (") (A)
- identify 1/2 inch on a ruler and measure objects to the nearest 1/2 inch (A)
- identify 1/4 inch on a ruler and measure objects to the nearest 1/4 inch (A)
- identify a foot as a unit of length and measure objects to the nearest foot (A)
- identify a yard as a unit of length and measure objects to the nearest yard (A)
- identify the numerical relationships among inch, foot, and yard (A)

3.10.07 **Recognize and compare relationships (one dollar, five dollars and ten dollars)**
The student will be able to . . .
- show equivalent values of a dollar bill (A)
- use combinations of coins to make change through the value of one dollar (A)
- recognize and identify a five dollar bill and its equivalent values (A)
- recognize and identify a ten dollar bill and its equivalent values (A)

3.10.08 **Linear measurement—metric**
The student will be able to . . .
- identify a millimeter as a tenth of a centimeter and use the abbreviation mm (B)
- identify equivalent metric units of length (B)

3.10.09 **Capacity—metric**
The student will be able to . . .
- identify and compare the milliliter (ml) to the liter (l) (B)
- identify equivalent metric units of capacity (B)

3.10.10 **Measurement—speed**
The student will be able to . . .
- identify uniform speed as rate (C)
- identify time as the number of hours traveled (C)
- solve word problems related to the skills learned in this module (C)

4.10.01 **Money to fifty dollar bill**
The student will be able to . . .
- recognize and identify ten, twenty, and fifty dollar bills, and their equivalent monetary values (A)
- solve word problems related to the skills learned in this module (A)

4.10.02 **Linear measurement**
The student will be able to . . .
- identify 1/8 inch on the ruler (A)
- identify a mile as a customary measure of distance (A)
- identify the equivalent relationships among inch, foot, yard and mile (A)
- identify a kilometer as a metric measure of distance (A)

4.10.03 **Customary capacity relationships**
The student will be able to . . .
- identify and compare the number of ounces in a cup, a pint, and a quart (A)
- identify the relationships among cups, pints, quarts, and gallons (A)
- use measuring skills to follow the directions in a recipe (A)

4.10.04 **Perimeters**
The student will be able to . . .
- identify perimeter as the total distance around the sides of an object or space (A)
- find the perimeter of a rectangle (A)
- develop and use a formula for finding the perimeter of a rectangle (B)

4.10.05 **Circumference**
The student will be able to . . .
- define circumference as the distance around a circle (B)
- find the relationship between diameter and circumference (B)
- find the relationship between radius and circumference (B)

4.10.06 **Measurement—temperature**
The student will be able to . . .
- read and locate the degrees for the freezing point of water (32°F), the boiling point of water (212°F), and normal body temperature (98.6°F) on a Fahrenheit thermometer (A)
- read and locate the degrees for the freezing point of water (0°C), the boiling point of water (100°C), and normal body temperature (37°C) on a Celsius thermometer (A)

4.10.07 **Area**
The student will be able to . . .
- define and measure the area of a rectangle by finding the number of square units contained in the rectangle (A)
- develop and use a formula to find the area of a rectangle (B)

4.10.08 **Volume**
The student will be able to . . .
- define and measure the volume of a rectangular prism (block) as the number of cubic units contained in the block (A)
- develop and use a formula to find the volume of a rectangular prism (block) (B)

5.10.01 **Linear measurement—customary**
The student will be able to . . .
- estimate and measure lengths using inch, foot, and yard (A)
- measure lengths to the nearest 1/8 of an inch (B)
- solve word problems related to the skills learned in this module (A)

5.10.02 **Linear measurement—metric**
The student will be able to . . .
- identify and compare metric prefixes (A)
- estimate and measure lengths using millimeters, centimeters, meters (A)
- solve word problems related to the skills learned in this module (A)

5.10.03 **Perimeter**
The student will be able to . . .
- estimate the perimeter of a polygon using customary and/or metric units (A)
- develop and use a formula for finding the perimeter of a rectangle using customary and/or metric units (A)
- solve word problems related to the skills learned in this module (A)

5.10.04 **Circumference**
The student will be able to . . .
- define circumference as the distance around a circle (A)
- explain the relationship between diameter and circumference and between radius and circumference (A)

5.10.05 **Area of a rectangular region**
The student will be able to . . .
- develop and use a formula to find area (A) of a rectangle using customary and metric units (A)
- solve word problems related to the skills learned in this module (A)

5.10.06 **Areas of irregular shapes**
The student will be able to . . .
- estimate area by counting squares (B)
- find area by splitting a rectilinear figure into rectangles (B)

5.10.07 **Scale drawings**
The student will be able to . . .
- explain the need for scale drawings (A)
- use a ratio to compare the measurements on scale drawings with actual measurements (A)
- obtain information from a scale drawing (B)
- make a scale drawing using a centimeter grid (C)

5.10.08 **Weight**

The student will be able to . . .

- identify the relationships among ounces (oz.), pounds (lbs.), and tons (t) (B)
- identify the relationships among gram (g), milligram (mg), kilogram (kg), and metric ton (A)
- estimate and weigh familiar objects in customary and metric units (A)
- solve word problems related to the skills learned in this module (A)

5.10.09 **Linear measurement/fractional relationships**

The student will be able to . . .

- use fractions to identify relationships among inch, foot, yard, mile (B)
- solve word problems related to the skills learned in this module (B)

5.10.10 **Time: fractional relationships**

The student will be able to . . .

- identify the relationships among months and years (B)
- identify the relationships among seconds, minutes and hours (A)
- identify a decade (B)
- identify a century (B)
- solve problems relating to skills learned in this module (B)

5.10.11 **Distance**

The student will be able to . . .

- recognize the formula for distance (C)
- solve word problems related to the skills learned in this module (C)

6.10.01 **Perimeter of polygons**

The student will be able to . . .

- find the perimeter of equilateral polygons (A)
- find the perimeter of other polygons (A)
- solve word problems related to the skills learned in this module (A)

6.10.02 **Operations with measures**

The student will be able to . . .

- convert hours and minutes to minutes (A)
- multiply units of weight by a 1-digit multiplier and convert products to simplest form (A)
- multiply units of liquid measure by a 1-digit multiplier and convert products to simplest form (A)
- multiply units of linear measure by a 1-digit multiplier and convert products to simplest form (A)

6.10.03 **Metrics**

The student will be able to . . .

- define meter, liter and gram using the following prefixes: deci (1/10 of a standard unit), centi (1/100 of a standard unit), milli (1/1000 of a standard unit), deka (10 standard units), hecto (100 standard units), kilo (1000 standard units) (A)
- draw approximate comparisons between metric units and customary units of measure (A)

6.10.04 **Circumference**

The student will be able to . . .

- construct a circle given the radius (B)
- compute the diameter of a circle given its radius using the equation $d = 2r$ (A)
- determine the relationship of the circumference of a circle to the diameter of a circle (A)

6.10.05 **Area of polygons**

The student will be able to . . .

- measure the area of an object using standard or metric square units of measure (A)
- determine and use the formula for finding the area of a rectangle (A)
- find the area of parallelograms using the formula $A = b \times h$ (Area = base × height) (A)
- find the area of any triangle given the base and the height using the formula $\frac{1}{2} \times b \times h$ (Area = $\frac{1}{2}$ × base × height) (A)

6.10.06 **Volume**

The student will be able to . . .

- recognize the cubic inch as a standard unit of measure for space (A)
- develop the formula and compute the volume of a rectangular prism (A)
- determine the volume of a cylinder by using metric capacity measures (A)

6.10.07 **Scale drawings**

The student will be able to . . .

- interpret the meaning of the legend shown on maps (A)
- recognize illustrations drawn to scale (A)
- make a scale drawing (A)

7.10.01 **Measurement—linear (English)**

The student will be able to . . .

- select the appropriate unit for measuring length (A)
- measure a given line segment with a standard ruler in English units to the nearest 1 in., 1/2 in., 1/4 in., 1/8 in. (A)
- convert a given measure of length to another equivalent unit of length (A)
- solve verbal problems related to the skills learned in this module (A)

7.10.02 **Computation with customary measurement**

The student will be able to . . .

- compute the sum of different units of length, time, weight, liquid measure (A)
- compute the difference of a measurement given in linear units, time units, weight units, or liquid volume units (A)
- compute the product of a measurement given in linear units, time units, weight units or liquid volume units (A)
- compute the quotient of a measurement given in linear units, time units, weight units or liquid volume units (A)
- solve verbal problems related to the skills learned in this module (A)

7.10.03 **Metric units**

The student will be able to . . .

- select the appropriate unit of linear, volume and weight measure (A)
- describe the relationships between/among metric prefixes using base ten and identify the symbols for metric units (A)

7.10.04 **Perimeter, area and volume**

The student will be able to . . .

- use the formulas for finding the perimeter of a rectangle, triangle, square (A)
- find the area of polygons by using the appropriate formulas (A)
- compute the volume of a rectangular prism and a cube in standard units of measure using the formulas, $V = L \times W \times H$ and $V = B \times H$ (where B = the area of the base) (A)
- solve verbal problems related to the skills learned in this module (A)

7.10.05 **Perimeter of irregular figures**

The student will be able to . . .

- define and identify a semicircle (B)
- find the length of a semi-circumference (B)
- find missing lengths of irregular figures by applying the properties involving opposite sides of a rectangle (B)
- find the perimeter of irregular geometric figures (use $\pi = 3.14$ (B)

8.10.01 **Perimeter**

The student will be able to . . .

- find the perimeter of a regular polygon (A)
- solve verbal problems related to the skills learned in this module (A)

8.10.02 **Perimeter of irregular figures**

The student will be able to . . .

- define and identify a semicircle (A)
- find the length of a semicircle (A)
- find the missing lengths of irregular figures by applying the properties of a rectangle (A)
- find the perimeter of irregular geometric figures (use $\pi \cong 3.14$) (A)

8.10.03 **Area**

The student will be able to . . .

- compute the area of a right triangle (A)
- compute the area of a parallelogram (A)
- compute the area of a trapezoidal region using the formula $A = 1/2h(b_1 + b_2)$ (A)
- compute the areas of a circular region (use $\pi \cong 3.14$) (A)
- solve verbal problems related to skills learned in this module (A)

8.10.04 **Surface area**

The student will be able to . . .

- define and find the surface area of a rectangular prism or cube (B)
- find the surface area of a cylinder (B)
- find the surface area of a pyramid (B)
- solve verbal problems related to the skills learned in this module (B)

8.10.05 **Volume**

The student will be able to . . .

- find the volume of a cube (A)
- find the volume of a prism (A)
- recognize the formula for and compute the volume of a pyramid (A)
- find the volume of a right circular cylinder (A)
- recognize the formula for and compute the volume of a cone (A)
- recognize the formulas for and compute the volume of a sphere (B)
- solve verbal problems related to the skills learned in this module (A)

ALGEBRAIC CONCEPTS

Topic 11

1.11.01 **Number sentences**
The student will be able to . . .
- recognize a number sentence that is true or false (B)
- read and complete number sentences with place holders (B)

2.11.01 **Open sentences**
The student will be able to . . .
- identify and solve an open sentence (A)
- use tables to show number relationships (B)
- use place holders to identify patterns of sums and differences (B)

3.11.01 **Open sentences**
The student will be able to . . .
- identify and solve open number sentences (A)
- use tables to show number relationships (A)

3.11.02 **Inequalities**
The student will be able to . . .
- read and write addition and multiplication inequalities (A)
- solve inequalities involving addition and multiplication and write solution sets (A)

4.11.01 **Open sentences**
The student will be able to . . .
- identify an open sentence as a number sentence in which a letter or frame is used in place of a number (A)
- solve an open sentence (A)
- using the information from a given table, write the open sentence that could be used to find the missing information (B)

5.11.01 **Order of operations**
The student will be able to . . .
- explain and utilize the correct sequence of operations (A)
- recognize that in the conventional sequence of operations, any calculations indicated within parentheses must be performed first (A)

6.11.01 **Open sentences and solution sets**
The student will be able to . . .
- define and recognize open sentences using variables and equal (=) symbols (A)
- define equivalent open sentences as equations having the same solution set (A)

6.11.02 **Graph coordinates**
The student will be able to . . .
- complete a table of solutions for an equation with two variables (B)
- graph solution sets of an equation with two variables (values greater than zero) (B)

7.11.01 **Translating arithmetic word phrases into numerical phrases**
The student will be able to . . .
- list the operations and/or symbols associated with words (A)
- determine which operations have the commutative property (A)
- translate a word phrase expressing a binary operation into a mathematical expression (A)

7.11.02 **True and false numerical statements**
The student will be able to . . .
- state the order of operations as it applies to addition, subtraction, multiplication and division (A)
- determine whether a numerical expression is a phrase or a sentence (A)
- translate a word sentence into a numerical sentence included parentheses (B)
- determine whether a numerical statement is true or false (A)

7.11.03 **Variables**
The student will be able to . . .
- state the meaning of a variable (A)
- determine the value of an expression (A)

7.11.04 **Functions (relationships of variables)**
The student will be able to . . .
- recognize a function in the form $y = ax$ (B)
- recognize a function in the form $y = ax + b$ (B)

8.11.01 **Algebraic expressions and sentences**
The student will be able to . . .
- translate a verbal phrase into mathematical symbols (A)
- translate an open verbal sentence or a verbal statement into mathematical symbols (A)
- evaluate an algebraic expression (A)

8.11.02 **Solution sets**
The student will be able to . . .
- identify sentences as either equations or inequalities (A)
- determine by inspection the solution set of an equation in one variable given a finite set of integers (A)
- determine by inspection the solution set of an equation in one variable given an infinite set of integers (A)
- determine the solution set of an equation in one variable given a finite set of rational numbers (A)

8.11.03 **Inequalities**
The student will be able to . . .
- determine the solution set of an inequality in one variable given a finite replacement set of integers (A)
- determine the solution set of an inequality in one variable given an infinite replacement set of integers (A)
- graph the solution set of an inequality on a number line (A)

8.11.04 **First degree equations and inequalities**
The student will be able to . . .
- use the reflexive, symmetric and transitive properties of equality (A)
- solve an equation in the form $x + b = c$ or $x - b = c$ (A)
- solve an equation in the form $ax = c$ or $x/a = c$ where $a \neq 0$ (A)
- solve an equation in the form $ax + b = c$, where $a \neq 0$ (A)

8.11.05 **Graphs of first and second degree equations in two variables**
The student will be able to . . .
- identify horizontal, vertical and oblique lines (B)
- make a table of values for equations in the form $y = ax$, $y = ax + b$ and $ax + by = c$ where $a \neq 0$ and $b \neq 0$ (B)
- graph a first degree equation in two variables from a table of values (B)
- make a table of values for equation in the form $y = ax^2$ and $y = -ax^2$ (B)
- graph a second degree equation in the form $y = ax^2$ or $y = -ax^2$ from a table of values (B)
- solve verbal problems related to skills learned in this module (B)

8.11.06 **Coordinate planes—first quadrant**
The student will be able to . . .

- graph an equation of the form $x = a$, $x = -a$, $y = a$, $y = -a$ (A)
- graph an inequality of the form $x > a$, $y > a$, $x < a$ and $y < a$ in the first quadrant (B)
- graph an inequality of the form $y > ax$, $y < ax$, $y > x + b$, $y < x + b$, $y > ax + b$ and $y < ax + b$ in the first quadrant (B)
- name an inequality of the form $y > a$, $y < a$, $y \geq a$, $y \leq a$, $x > a$, $x < a$, $x \geq a$, $\leq ?$ a when given a graph in the first quadrant (B)

8.11.07 **Coordinate planes—all quadrants**
The student will be able to . . .

- graph an inequality of the form $x > a$, $y > a$, $x < a$ and $y < a$ in any quadrant (B)
- graph an inequality of the form $y > ax$, $y < ax$, $y > x + b$, $y < x + b$, $y > ax + b$ and $y < ax + b$ in any quadrant (B)
- graph a compound inequality in the form $y \geq ax + b$ or $y \leq ax + b$ in any quadrant (B)
- name an inequality in the form $x > a$, $x \geq a$, $y > a$, $y \geq a$, $x < a$, $x \leq a$, $y < a$ or $y < a$ when shown in the graph (B)

GRAPHS, PROBABILITY, STATISTICS

Topic 12

0.12.01 **Number relationships**
The student will be able to . . .
- construct a bar graph using blocks/cubes
- transfer a graph to a pictorial representation
- interpret pictorial representations as those representing concrete objects or people
- identify number relationships using symbols and pictures
- count aloud the number of squares that are colored on a bar graph
- color the corresponding number of squares on a vertical bar graph when given concrete objects or the pictorial representation
- write the numeral that represents the number of squares colored on a vertical and horizontal bar graph

0.12.02 **Graph reading**
The student will be able to . . .
- construct and interpret a simple picture graph

0.12.03 **Chance events/predicting**
The student will be able to . . .
- distinguish between certain and uncertain in regard to events
- distinguish between more or less likely in chance situations
- recognize the outcome of activities as chance (guessing)

1.12.01 **Pictographs**
The student will be able to . . .
- collect, organize and graph data relating to preference using two categories at a time (A)
- read and interpret the information given in a graph using more than two categories (A)
- use information on a graph to answer questions involving more or less (A)

1.12.02 **Bar graphs**
The student will be able to . . .
- color the corresponding number of squares on vertical or horizontal bar graphs, when given concrete objects or the pictorial representation (B)
- identify and record the number of squares that are colored on a bar graph (B)
- gather, organize and record data based on personal or group experiences to complete a bar graph using one-to-one correspondence (B)

1.12.03 **Probability—chance events**
The student will be able to . . .
- predict the likelihood of events happening (B)
- record the outcome of a chance event (B)

2.12.01 **Data—collect, tabulate, arrange and compare in tables**
The student will be able to . . .
- collect, tabulate and arrange data in a table (A)
- compare data in a table (A)

2.12.02 **Bar graphs**
The student will be able to . . .
- collect and structure data based on personal or group experiences to complete a bar graph (A)
- interpret a bar graph (A)

2.12.03 **Probability—predict and tally outcomes**
The student will be able to . . .
- predict the outcome of three equally likely events (B)
- tally the outcome in a three-possibility event (B)

2.12.04 **Arrangements of 2 through 5 items**
The student will be able to . . .
- make arrangements of 2 through 5 items using all the items (B)
- define and identify subsets of a given set of objects (B)
- make subsets of 1 or 2 objects from sets of 3 or 4 concrete objects (B)

2.12.05 **Ratio—2:1 correspondence**
The student will be able to . . .
- use two-to-one correspondence to develop the concept of ratio (B)
- use a chart to show ratio (B)

3.12.01 **Bar graphs**
The student will be able to . . .
- read and interpret a bar graph (A)
- construct a bar graph (A)

3.12.02 **Probability**
The student will be able to . . .
- predict the outcomes of equally likely events, and compare the results with the predictions (A)
- predict the outcome of unequally likely events (A)

3.12.03 **Arrangements—tree diagrams**
The student will be able to . . .
- list and count the number of possible arrangements in a set of objects (A)
- make a tree diagram to display combinations of given data (A)

4.12.01 **Graphs**
The student will be able to . . .
- make frequency tables from tallied data (A)
- graph data drawn from newspapers, magazines, polls, and appropriate activities (A)
- read and interpret information from a line graph (B)
- construct a line graph from a table of data (B)

4.12.02 **Statistics**
The student will be able to . . .
- find the mean (average) from given data (A)
- solve word problems involving finding the averages of given numbers (A)
- define the range as the difference between the largest and the smallest numbers in a set (A)
- identify the mode as the number that occurs most frequently (B)

4.12.03 **Probability**
The student will be able to . . .
- determine probabilities by comparing favorable outcomes with total possible outcomes and express as fractions (A)
- determine probabilities where the outcomes are not equally likely and express as fractions (A)
- predict the outcomes of probability experiments (A)

4.12.04 **Arrangements**
The student will be able to . . .
- identify all the possible arrangements for a group of objects (A)
- solve word problems related to skills learned in this module (A)

5.12.01 **Statistics—mean and median**
The student will be able to . . .
- find the **range** and **mean** when given a set of numerical data (A)
- find the **median** of the set when given an **odd** number of values (B)

5.12.02 **Line graphs**
The student will be able to . . .
- read and interpret information from a line graph (A)
- construct a line graph from a table of data (A)

5.12.03 **Circle graphs**

The student will be able to . . .

- read and interpret a circle graph (A)
- use a protractor to construct circle graphs where the sectors represent fractions with like denominators (B)
- use a protractor to construct circle graphs where the sectors represent fractions with unlike denominators (B)

5.12.04 **Comparing graphs**

The student will be able to . . .

- compare data presented in various graphic formats (A)
- construct various types of graphs to illustrate the same set of data (C)

5.12.05 **Probability concepts**

The student will be able to . . .

- for a given experiment identify events which are impossible, certain, or which sometimes occur (A)
- identify, among events that may occur for a given experiment, those which are **equally likely** to occur and those which have **different chances** of occurring (A)
- recognize a **sample space** for a given experiment (A)
- for an experiment which has a sample space of equally likely outcomes, express the probability of an event as the fraction:

$$\frac{\text{number of favorable outcomes possible}}{\text{number of outcomes in the sample space}}$$ (A)

- conduct probability experiments where each outcome is equally likely to occur, and compare the results with predictions (A)

5.12.06 **Simple probability relationships**

The student will be able to . . .

- design and conduct probability experiments where the outcomes are not equally likely to occur, and compare results to the predictions (A)
- state that, for a given experiment, the sum of the probabilities of all possible outcomes will always be one (A)
- describe the relationship between the probability of event "A" and the probability of "not A"; use this relationship to calculate probability (A)

5.12.07 **Double bar graphs**

The student will be able to . . .

- read and interpret a double bar graph (A)
- construct a double bar graph from a set of data (B)

6.12.01 **Graphs**

The student will be able to . . .

- interpret and construct circle graphs from a table of data (A)
- construct and compare bar, line and circle graphs and note the advantages and disadvantages of each (A)

6.12.02 **Statistics**

The student will be able to . . .

- find the mode of a given set of data (A)
- find the median of a given set of data (A)
- identify the mean, median and mode after involvement in an extended recording project (A)

6.12.03 **Compound probability**
The student will be able to . . .
- determine the probability of one outcome from a sample space (A)
- determine the probability of two independent events occurring together from a sample space (A)

6.12.04 **Coordinate systems**
The student will be able to . . .
- locate, read, and interpret coordinates on a graph (C)
- graph points whose coordinates include positive and negative numbers using all 4 quadrants (C)

6.12.05 **Permutations and combinations**
The student will be able to . . .
- count the number of permutations that can be made with a set of objects (A)
- use the multiplication principle to determine the number of permutations that can be made with a set of objects (A)
- count the number of groups when making combinations (A)

7.12.01 **Probability**
The student will be able to . . .
- construct a sample space for various experiments (A)
- read and use the expression P(A) to represent the probability of event A (A)
- write the probabilities involved with simple experiments: flipping a coin, rolling a die (A)

7.12.02 **Probability with a spinner**
The student will be able to . . .
- state that the sum of the probabilities in a given experiment is always 1 (A)
- state and use the meaning of equally likely events (A)
- state and use the meaning of complementary events to their probabilities (A)

7.12.03 **Multiple graphs**
The student will be able to . . .
- construct, read and interpret a multiple bar graph (involving a two bar comparison) (B)
- read and interpret a multiple line graph (involving a two line comparison) (B)
- construct, read and interpret a circle graph (involving fractional or percent comparisons) (B)

7.12.04 **Frequency tables**
The student will be able to . . .
- obtain the mode from the frequency table (A)
- recognize how changes in data affect the mean, median and mode (A)

7.12.05 **Compound probability**
The student will be able to . . .
- determine the probability of two independent events occurring together by using a sample space (B)
- determine the probability of either of two outcomes occurring by using a sample space (B)

8.12.01 **Multiple graphs**

The student will be able to . . .

- construct, read and interpret a multiple bar graph (involving a two bar comparison) (A)
- construct, read and interpret a multiple line graph (involving a two line comparison) (A)
- construct, read and interpret a circle graph (involving fractional or percent comparisons) (A)

8.12.02 **Statistics**

The student will be able to . . .

- read, interpret and make a histogram (A)
- make a frequency polygon from a histogram (A)

8.12.03 **Comparison of permutations and combinations**

The student will be able to . . .

- determine a permutation of n things taken r at a time where $r \leq n$ (A)
- compare the number of arrangements in a permutation with the number of arrangements in a combination (A)

8.12.04 **Compound probability**

The student will be able to . . .

- determine the probability of two independent events occurring together by using a sample space and a formula (A)
- determine the probability of either of two outcomes occurring by using a sample space and a formula (A)
- determine the probability of more than two independent outcomes occurring at the same time using a formula (B)
- determine the probability of exactly, at least or at most r successes in n trials by experimentation (B)

PROBLEM SOLVING

Topic 13

0.13.01 **Problem solving: language**
The student will be able to . . .
- locate and describe objects in the classroom
- locate and describe objects within a picture
- make and explain inferences based upon information obtained from a picture

0.13.02 **Problem solving: one-to-one correspondence**
The student will be able to . . .
- match pictures and objects
- solve simple problems using one-to-one correspondence

1.13.01 **Use drawings to represent objects**
The student will be able to . . .
- fill in the missing part of a picture (A)
- make drawings to represent objects in a picture (A)

1.13.02 **Develop mathematical language through questions**
The student will be able to . . .
- identify numerical information within a picture (A)
- distinguish between a fact and a question (A)
- develop questions based upon information obtained from a picture (A)

1.13.03 **Use tables to develop questioning skills**
The student will be able to . . .
- collect and record data on a table (A)
- develop questions based upon information obtained from a table (A)

1.13.04 **Solve story problems**
The student will be able to . . .
- solve story problems through dramatization (A)
- solve story problems using a number line (B)

1.13.05 **Story problems/number sentences**
The student will be able to . . .
- translate a story problem into a number sentence (A)
- create a story problem given a number fact through 9 (A)

1.13.06 **Problem solving: patterns**
The student will be able to . . .
- identify the rule for a non-numerical pattern, given the pattern (A)
- identify the rule for a numerical pattern, given the pattern (A)
- identify patterns for sums and differences using concrete materials and tables (B)

2.13.01 **Locate information**
The student will be able to . . .
- locate information in the environment in order to solve simple problems (A)
- locate information in a picture in order to solve simple problems (A)
- locate information on a table or chart in order to solve simple problems (A)

2.13.02 **Guess and check**
The student will be able to . . .
- check guesses against problem conditions in non-numerical problems (A)
- check guesses against problem conditions in numerical problems (A)

2.13.03 **Use data**
The student will be able to . . .
- answer questions based upon a set of data (A)
- create questions based upon a set of data (A)
- make inferences based upon a set of data (A)

2.13.04 **Patterns**
The student will be able to . . .
- create and explain a pattern using concrete material (A)
- complete a picture pattern and state the rule (A)
- complete a numerical pattern and state the rule (A)

2.13.05 **Missing information**
The student will be able to . . .
- determine whether sufficient information exists to solve a problem (A)
- supply missing information to solve a problem (A)

3.13.01 **Guess and check**
The student will be able to . . .
- make and verify a guess (A)
- check his/her guess against problem conditions (A)

3.13.02 **Locate information**
The student will be able to . . .
- locate pertinent information within a chart/table to solve problems (A)
- locate pertinent information within a paragraph to solve problems (A)

3.13.03 **Patterns**
The student will be able to . . .
- complete a numerical pattern and state the rule for the pattern (A)
- arrange numbers to form a pattern and state the rule for the pattern (A)

3.13.04 **Create models/charts to solve problems**
The student will be able to . . .
- use representative materials to help solve a problem (A)
- create charts/tables to help solve problems (A)
- develop questions based upon information obtained from a model/chart (A)

4.13.01 **Problem solving: use tables and graphs to locate information**
The student will be able to . . .
- locate information on a table/chart and solve problems using this information (A)
- locate information on a graph and solve problems using this information (A)

4.13.02 **Problem solving: use number sentences to solve problems**
The student will be able to . . .
- translate a one step word problem into an open number sentence and solve (A)
- choose and sequence operations to solve a two step word problem (A)
- create a word problem based upon a solution (B)

4.13.03 **Problem solving: guess and check**
The student will be able to . . .
- check guesses against problem conditions involving place value problems (A)
- check guesses against problem conditions involving addition and subtraction problems (A)
- check guesses against problem conditions involving multiplication and division problems (A)

4.13.04 **Problem solving: patterns**
The student will be able to . . .
- locate patterns on a calendar (A)
- locate patterns on a chart/table (A)

5.13.01 **Problem solving: draw a picture/make a table**
The student will be able to . . .
- draw a picture to help solve a problem (A)
- make a table to solve a problem (A)
- create and solve problems for which pictures or charts are helpful tools (B)

5.13.02 **Problem solving: using prior knowledge**
The student will be able to . . .
- identify the prior knowledge needed to solve a problem and use that knowledge to solve the problem (A)
- create and solve problems where prior knowledge is needed (B)

5.13.03 **Problem solving: solve a simpler problem**
The student will be able to . . .
- solve problems by creating and solving similar, but simpler, problems (A)
- create and solve a problem which can be solved by using a simpler problem (A)

5.13.04 **Problem solving: working backward**
The student will be able to . . .
- solve problems by working backward (A)
- create a problem which can be solved by working backward (C)

6.13.01 **Organize data to perceive patterns**
The student will be able to . . .
- recognize patterns to solve problems (A)
- create a simple chart in order to recognize a pattern (A)
- organize data on a chart to perceive patterns to solve problems (A)

6.13.02 **Use number sentences to solve problems with two or more steps**
The student will be able to . . .
- choose and sequence operations to solve a two step word problem (A)
- choose and sequence operations to solve a three step world problem (A)

6.13.03 **Organize data into tables and charts**
The student will be able to . . .
- complete a table of missing information (A)
- organize data into a table in order to solve a problem (A)

6.13.04 **Use models to solve problems**
The student will be able to . . .
- use a model drawing to solve a problem (A)
- create questions given a model (A)

7.13.01 **Solving a simpler but equivalent problem**
The student will be able to . . .
- use models/chart to simplify a problem (A)
- solve problems by simplifying the data by finding a pattern (A)

7.13.02 **Working backwards**
The student will be able to . . .
- make a model/chart of data in a problem (A)
- use a model/chart to solve a problem by working backwards (A)

7.13.03 **Guess and check**
The student will be able to . . .
- make and refine a guess about his/her environment (A)
- check guesses about problem conditions (A)

7.13.04 **Patterns**

The student will be able to . . .

- identify and extend a numerical pattern (A)
- use patterns to solve problems (A)

8.13.01 **Selection by elimination**

The student will be able to . . .

- use information given in a problem to eliminate all possible solutions except the correct one (A)
- list all possible solutions and then eliminate all but the correct one (A)

8.13.02 **Models**

The student will be able to . . .

- make a picture-type model to solve a problem (A)
- select a physical or paper-pencil type model to solve a problem (A)

8.13.03 **Tables**

The student will be able to . . .

- make a list to solve a problem (A)
- find a rule from a table (A)
- use a table to generate information not given to solve a problem (A)

FUNDAMENTALS OF MATHEMATICS

PARTS I & II

INTRODUCTION

Fundamentals of Mathematics, Parts I & II is designed to provide appropriate mathematics experiences for pre-algebra students. These experiences emphasize the development of computational skills, mathematical concepts, and problem-solving techniques. For some students, this course will contribute to later success in algebra; for others, it represents part of a program in everyday mathematical literacy.

Fundamentals of Mathematics, Parts I & II may be used as the basis for a one year course. The complete course is divided into 12 basic units. A student who masters the content of *Fundamentals of Mathematics* is well prepared to take the Regents Competency Test (RTC).

The curriculum guides corresponding to these learning outcomes are available from the Publication Sales Office at 131 Livingston Street, Brooklyn, NY, 11201. Specify ISBN 88315-633-4 *(Fundamentals of Mathematics I)* and 88315-634-2 *(Fundamentals of Mathematics II).*

Table of Contents for Fundamentals of Mathematics

Unit I. Formulas 93
Unit II. Introduction to Algebra 94
Unit III. Metric Measurement 96
Unit IV. Plane Geometry 98
Unit V. Money Management 100
Unit VI. Probability and Statistics 102
Unit VII. Solving Simple Equations 104
Unit VIII. Tables, Graphs and Coordinate Geometry 106
Unit IX. Banking and Taxes 108
Unit X. Areas 110
Unit XI. Indirect Measure and Scaling 111
Unit XII. Solid Geometry 112

Unit 1. Formulas

GOAL: To use symbols to represent numbers and operations

The student will be able to:

- state the operation associated with the words: sum, product, difference, quotient, more than, less than, diminished by, increased by, factor, etc.
- translate an English phrase expressing a binary operation into numerical symbols.
- use a variable in a binary expression.
- represent a product of two or more numbers in the following four ways: X, ., ( ), and no sign at all.
- evaluate numerical expressions containing only one binary operation where the numbers are whole numbers.

GOAL: To evaluate algebraic expressions with one or more variables

The student will be able to:

- translate a phrase containing one or more variables into an algebraic expression.
- replace variables in an algebraic expression with their designated numerical values.
- change the format of a numerical expression for computational purposes.
- perform the indicated operations in numerical expressions.
- differentiate between algebraic and numerical expressions.

GOAL: To evaluate expressions using the correct order of operations

The student will be able to:

- state the order in which operations are to be performed.
- evaluate numerical expressions using the correct order of operations.
- evaluate algebraic expressions for stated values of the variables, using the correct order of operations.
- state that a numerical expression has only one value.

GOAL: To use parentheses as a grouping symbol

The student will be able to:

- recognize that operations within parentheses are to be performed first.
- evaluate numerical expressions with parentheses.
- recognize the "distributive property of multiplication over addition."

GOAL: To evaluate numerical expressions containing exponents

The student will be able to:

- express a number written in exponential form as a repeated multiplication.
- state the meaning of base, exponent and factor.
- evaluate numerical expressions containing exponents.
- compute the squares and cubes of numbers.

GOAL: To evaluate algebraic expressions containing exponents

The student will be able to:

- evaluate algebraic expressions containing exponents.
- rewrite variables with exponents as repeated multiplications.

GOAL: To evaluate the subject of formulas

The student will be able to:

- state a need for using formulas.
- state the difference between a formula and an expression.
- recognize the subject of a formula.
- find the value of the subject of a formula

Unit II. Introduction to Algebra

GOAL: To use symbols of equality and inequality

The student will be able to:

- compare two whole numbers verbally using the words "greater than", "is less than," "or is equal to."
- use symbols of equality and inequality to compare two whole numbers.
- recognize whether a sentence using ◄, =, or ► is true or false.

GOAL: To order numbers on a number line

The student will be able to:

- construct a number line using a unit length with end points at 0 and 1, and extending to include all whole numbers.
- locate any positive whole number on the number line, thereby, showing understanding of the one-to-one correspondence between whole numbers and points on the line.
- compare the positions of two points on the line to their relative size (smaller is to the left).
- describe the order of two numbers on the number line using ◄ and ►.
- describe the order of two lettered points on the line using ◄ and ►.
- state the rule, "if **a** is to the right of **b**, then **a** ► **b** or **b** ◄ a.
- understand the correspondence of rational numbers to points on the number line by subdividing a unit on the number line (quarter units only).

GOAL: To introduce ruler fractions

The student will be able to:

- recognize when two rational numbers are equivalent (denominators 2, 4, 6, 8, 16).
- use **or** to describe the order of ruler fractions.
- change an improper fraction into a mixed number and vice versa.

GOAL: To read a ruler

The student will be able to:

- read the markings on a ruler.
- measure line segments with a ruler.
- name line segments using two capital letters.
- compare lengths of line segments.

GOAL: To comprehend the meaning of directed numbers

The student will be able to:

- represent gains and losses, right and left, above and below zero, etc. as signed numbers.
- write the opposite of a given situation.
- write the opposite of a given signed number.

GOAL: To extend the number line to include negative numbers

The student will be able to:

- draw the number line to the left of 0 to allow for movement in both directions.
- rename the points on the number line using positive and negative numbers.
- define movement to the right on a number line as positive and movement to the left as negative.
- express the distance between 2 points as a signed number.

GOAL: To establish an ordering property of positive and negative rational numbers

The student will be able to:

- express the order of two positive integers in terms of their position on the number line (**a** is to the left of **b**, so **a** ◄ **b**).
- use the ordering symbols for all signed numbers (i.e., -2 ► -6 because -2 is to the right of -6).
- find the least common denominator, given two or more fractions where the denominator of one is a multiple of the denominator of the other.

GOAL: To compare two rational numbers

The student will be able to:

- find the least common denominator, given two fractions with relatively prime denominators.
- find the least common denominator, given two fractions with unlike denominators which are not relatively prime.
- use ◄, ►, and = to compare rational numbers with unlike denominators.

GOAL: To compare more than two rational numbers

The student will be able to:
- find the LCD for more than 2 fractions with unlike denominators.
- order more than 2 rational numbers with unlike denominators.

GOAL: To add signed numbers using the number line

The student will be able to:
- add two whole numbers on a number line.
- add positive and negative numbers on the number line. (Sums may be either positive or negative.)
- state and demonstrate the commutative property of addition on the number line.

GOAL: To develop a rule for the addition of signed numbers.

The student will be able to:
- state and apply the rules for adding signed numbers.
- define absolute value of an integer as its distance from 0 on a number line.
- define additive inverses as two numbers whose sum is 0.
- find the additive inverse of a number.

GOAL: To add rational numbers with like signs.

The student will be able to:
- add rational numbers with like denominators and like signs.
- add rational numbers with unlike denominators and like signs.

GOAL: To add rational numbers with unlike signs

The student will be able to:
- add rational numbers with like denominators with unlike signs.
- add rational numbers with unlike denominators with unlike signs.
- subtract rational numbers.

Unit III. Metric Measurement

GOAL: To introduce the units of linear measurement in the metric system

The student will be able to:

- identify the meter as the basic unit of linear measure in the metric system.
- express the numerical relationships between the meter and the millimeter, the centimeter, and the kilometer.
- recognize (visually) the similarity of the meter and the yard without making conversions.
- recognize the relative sizes of, and indicate appropriate uses for, the millimeter, centimeter and kilometer.

GOAL: To read and interpret large numbers and decimals

The student will be able to:

- write a numeral given in verbal form.
- name the place value of any digit in a whole number up to the millions place.
- name the place value of any digit in a decimal number up to the ten thousandths place.
- read any number expressed in symbol form from .0001 to 9,999,999 in words and vice versa.
- define negative exponents for powers of 10.
- express a fraction whose denominator is 10,000 or 1000 as a decimal or vice versa.

GOAL: To develop understanding of the metric ruler and the relationship between the meter and the centimeter

The student will be able to:

- identify and read the centimeter markings on a metric ruler.
- express the subdivisions of a centimeter as tenths of a centimeter.
- measure lengths in meters and centimeters with a ruler.
- apply the rule for converting meters to centimeters by multiplying by 100.

GOAL: To develop understanding of the relationship between the centimeter and the millimeter, and between the meter and the millimeter.

The student will be able to:

- identify and read the millimeter markings on a ruler.
- convert measurements from cm to mm and m to mm (multiply by 10 and 1000).
- measure lengths in millimeters.

GOAL: To convert from smaller to larger metric units

The student will be able to:

- convert from millimeters to centimeters, from centimeters to meters and from millimeters to meters.

GOAL: To develop understanding of the relationship between the meter and the kilometer

The student will be able to:

- compare the relative sizes of kilometers and miles, e.g., 50 miles is about 80 kilometers.
- convert measurement from meters to kilometers and vice versa.

GOAL: To provide practice in converting from one metric unit of linear measure to another, with a variety of application exercises

The student will be able to:

- apply the metric lengths to various problem situations.
- express the quotient of two whole numbers as a decimal.

GOAL: To introduce the units of measure of weight in the metric system

The student will be able to:

- state that the gram is the basic unit of weight in the metric system.
- state that there are "about 30 grams to one ounce" (no conversions from one system to another are to be made).
- express the relationships among grams, milligrams and kilograms.
- compare the relative sizes of, and indicate appropriate uses for, the milligram, gram, and kilogram.

GOAL: To further develop understanding of the relationship between the gram and the kilogram

The student will be able to:

- convert from grams to milligrams and vice versa.

Unit IV. Plane Geometry

GOAL: To identify triangles and to classify them according to the lengths of their sides

The student will be able to:

- illustrate the importance of geometric shapes by referring to their uses in architecture and elsewhere.
- state the definition of triangle.
- divide the set of triangles into three groups: scalene, isosceles, and equilateral, relating the classification to the number of equal sides.

GOAL: To define "angle" and types of angles and to measure and label angles.

The student will be able to:

- describe an angle as a rotation (as the angle between the hands of a clock).
- state that one complete rotation is divided into 360 units called degrees.
- state that one-quarter of a rotation is a right angle (90°).
- state that one-half of a rotation is a straight angle (180°).
- state a definition for an acute angle, a right angle, an obtuse angle, and a straight angle.
- select by sight from given diagrams an acute, right, obtuse, and straight angle.
- to find the measure of an angle using a protractor.

GOAL: To determine the sum of the measures of the angles of a triangle

The student will be able to:

- state the relationship that the sum of the measures of the angles of a triangle is 180°.
- apply this relationship to find the measure of the third angle of a triangle when the measures of two angles are given.
- state that a triangle cannot include two right angles, two obtuse angles, or a right angle and an obtuse angle.

GOAL: To classify triangles according to the measures of their angles

The student will be able to:

- determine when a triangle is acute, right, or obtuse.
- state that equilateral triangles are equiangular.
- state that an isosceles triangle has two angles of equal measure.
- name the parts of a right triangle.
- state that the hypotenuse is the longest side of a right triangle, and is opposite the right angle.
- state that the legs of a right triangle form the right angle.

GOAL: To study the Pythagorean relationship

The student will be able to:

- state that **a** and **b** in the Pythagorean relationship ($a^2 + b^2 = c^2$) are the legs, and **c** is the hypotenuse.
- make a list of squares of whole numbers from 1 to 20.
- express a perfect square as the second power of one of its factors
- state that a perfect square can be written as the product of two equal factors.
- determine if a triangle is a right triangle using the Pythagorean relationship.

GOAL: To find square roots of perfect squares and apply the Pythagorean relationship

The student will be able to:

- read the symbol $\sqrt{\ }$ as "the square root of"
- state that the square root of a number is one of its two equal factors.
- find the square roots of perfect squares.
- use the Pythagorean relationship and the concept of finding a square root (by trial and error) to find the hypotenuse of several right triangles with whole numbered sides.
- find the length of a leg of a right triangle using the Pythagorean relationship.

GOAL: To identify quadrilaterals and to distinguish among the various special quadrilaterals, including the parallelogram, rectangle, rhombus, square, and trapezoid

The student will be able to:

- define quadrilateral.
- recognize the "special" quadrilaterals by their shapes.
- use the terms equilateral and equiangular when referring to the appropriate quadrilaterals.
- recognize the differences (and similarities) among the various types of quadrilaterals, emphasizing parallel lines, lengths of sides, and right angles.
- know some of the properties of the diagonals in the quadrilaterals (esp.: bisecting each other, equal lengths, and forming right angles).

GOAL: To identify polygons of more than four sides

The student will be able to:

- name polygons containing 5, 6, 8, 10, and 12 sides.
- define "regular polygon."
- state the relationship among the angles of some polygons that allows them to tessellate or "fit" together. (The sum of the measures of the angles about a point = 360°).
- state a relationship between the number of sides and the number of diagonals in a polygon.
- state a relationship between the number of sides in a polygon and the number of triangles with a common vertex that may be found in the polygon.

GOAL: To identify and discuss some of the points and lines in a circle

The student will be able to:

- define a circle as the figure formed by all the points a given distance from a fixed point.
- state that a circle can be approximated by constructing a regular polygon with a "large" number of sides (24 sides, for example).
- define and draw a radius, a diameter, a chord, an arc, a sector.
- state the relationship between a radius and a diameter.
- solve arithmetic problems relating diameters and radii, which use fractions and decimals.
- construct a circle using a compass.

GOAL: To calculate the perimeter of any polygon

The student will be able to:

- define perimeter.
- use fractions and decimal numbers to calculate perimeters of polygons.

GOAL: To solve various application problems involving perimeters of polygons

The student will be able to:

- use some properties of triangles (isosceles, equilateral) and polygons when solving perimeter problems.
- find the length of a missing side of a polygon when the perimeter and the other sides are given.
- perform subtractions with mixed numbers.

GOAL: To calculate the circumference of a circle using $\pi = 3.14$

The student will be able to:

- define circumference.
- measure circumferences of common objects using string and a ruler, or a tape measure.
- find an approximate value of π by relating the circumference and the diameter of objects.
- find the circumferences of circles using 3.14 for , where the radii and diameters are decimals or whole numbers.

GOAL: To calculate the circumference of a circle using $\pi = 22/7$

The student will be able to:

- find the circumferences of circles using 22/7 for π where the radii and diameters may contain fractions.

GOAL: To compute perimeters and circumferences

The student will be able to:

- determine which method of calculating the distance around a figure is required to solve a problem.
- compare perimeters and circumferences of various polygons and circles.

Unit V. Money Management

GOAL: To learn a method of subtracting dollars and cents from dollar amounts

The student will be able to:
- express a monetary value written in cents as a decimal.
- write dollar amounts as dollars and no cents.
- compute the change when items are paid for by $1, $5, $10, or $20 bills.

GOAL: To learn to use unit pricing in a supermarket

The student will be able to:
- state the relationships among liquid measures: ounces; pints; quarts; gallons.
- read and compare samples of supermarket unit price shelf markers to find the best buy.

GOAL: To compute the actual price from the unit price

The student will be able to:
- state the relationship between pounds and ounces in weight.
- find the product of two decimal numbers, and round off to the nearest hundredth.
- round off a monetary amount to the nearest cent.
- apply the rule: actual price = unit price times weight (or quantity).

GOAL: To compute the unit price from the actual price

The student will be able to:
- find the quotient of a decimal number (monetary value) by a whole number expressed to the nearest cent.
- find the quotient of one decimal number by another to the nearest hundredth.
- apply the rule: unit price = acutal price divided by the weight (or quantity).

GOAL: To compute the weight of an item, given the actual price and unit price

The student will be able to:
- apply the rule: weight (or quantity) = actual price divided by unit price.

GOAL: To review unit pricing

The student will be able to:
- calculate a missing unit pice, weight or quantity, or actual cost, given the other two.

GOAL: To compute salary based on an hourly wage

The student will be able to:
- define "gross wage."
- complete a payroll table which does not include any overtime pay.

GOAL: To read a time card

The student will be able to:
- determine the number of hours between two given clock times, including a.m. and p.m. times.

GOAL: To compute salary based on hourly and overtime wages

The student will be able to:
- find 1½ times any dollar amount to the nearest cent.
- determine a worker's overtime hours.
- complete a payroll table which includes time and a half overtime pay.

GOAL: To compute salary based on piecework or a piece-rate plan

The student will be able to:
- name several jobs which pay by the "piece-rate plan."
- complete a payroll table where the workers are paid by the piece.

GOAL: To find the cost of an item purchased on the installment plan

The student will be able to:

- explain why people purchase items on the installment plan.
- compute the total cost of an item purchased on the installment plan.
- compute the finance charge on an installment purchase.

GOAL: To compute payments based on a step function

The student will be able to:

- provide real-life examples of "step function" price scales.
- determine the number of units at each price.
- compute the total price by adding the initial charge to the product of the unit rate and the number of units at that price.

Unit VI. Probability and Statistics

GOAL: To introduce statistics as the science of collecting, organizing and interpreting data

The student will be able to:
- provide examples in which analysis of data is needed to make decisions in many fields: politics, retailing, science.
- define "statistics" as the science of collecting, organizing, and interpreting data.

GOAL: To organize and interpret statistical data using a frequency table

The student will be able to:
- read a set of random data, and set up a system of classes (categories) for the purpose of tallying.
- tally the data according to the scheme determined above.
- define "frequency."
- organize the data by completing a frequency table.

GOAL: To define and use the concept of *mode*

The student will be able to:
- define mode.
- identify the mode from frequency tables, including the class survey data table.
- define bimodality.

GOAL: To define and use the concept of *mean*

The student will be able to:
- define mean as the sum of the values divided by the number of values (average).
- apply the definition to find the mean, given a set of data.

GOAL: To define and use the concept of *median*

The student will be able to:
- arrange a set of data in numerical order
- define median.
- apply the definition to find the median in given sets of data.

GOAL: To introduce probability as the science of chance

The student will be able to:
- cite uses of "chance" or probability.
- guess (or predict) the outcomes of experiments with a spinner, dice, or coins.
- perform an experiment, tally the outcomes, and compare the outcomes to the predictions.

GOAL: To define probability of success and failure as ratios

The student will be able to:
- express a probability as a ratio of two quantities:

$$\frac{\text{number of successful outcomes}}{\text{total number of possible outcomes}}$$

- state the relationship between the number of outcomes, the number of successes, and the number of failures.
- use the rule that the probability of success plus the probability of failure equals 1. (Calculate the probability of an event given the probability of its complement.)
- reduce proper fractions to lowest terms.

GOAL: To reduce fractions to lowest terms

The student will be able to:
- write a composite number as a product of two or more factors.
- categorize numbers as a prime or composite
- identify the GCF (greatest common factor) of a pair of numbers.
- reduce a fraction to its lowest terms by dividing the numerator and denominator by their GCF.

GOAL: To introduce the concept of a sample space

The student will be able to:
- list all possible outcomes of a probability experiment (the sample space).
- calculate the probability of a given outcome in an experiment after listing the sample space.

GOAL: To use sample spaces to predict the outcomes of experiments

The student will be able to:

- describe a sample space and determine the probability of an event before performing an experiment.

GOAL: To determine the expected number of outcomes using the probability ratio

The student will be able to:

- calculate the predicted number of outcomes by using the rule.
  Predicted number of successful outcomes = probability of success times the number of trials.

Unit VII. Solving Simple Equations

GOAL: To solve open sentences by trial and error.

The student will be able to:

- distinguish between a mathematical phrase and a mathematical sentence.
- state whether or not a sentence is an open sentence.
- solve an open sentence using trial and error.

GOAL: To solve equations and inequalities given replacement sets.

The student will be able to:

- categorize a sentence as an equation or an inequality.
- state whether a replacement for a variable makes an open sentence true or false.
- use a given replacement set to find the solution set of an equation or inequality by trial and error.

GOAL: To solve equations using addition and subtraction.

The student will be able to:

- use the appropriate inverse operation and the addition and subtraction properties of equality to find the solution to equations of the form $x + a = b$ and $x - a = b$ where a and b are integers.
- check the solution of an equation.
- state that addition and subtraction are inverse operations.

GOAL: To reinforce solution of equations using addition and subtraction properties of equality.

The student will be able to:

- use the appropriate property of equality to find solutions to equations of the form $x \pm a = b$, where a and b are fractions and decimals.

GOAL: To solve equations of the form $ax = b$ and $\frac{x}{a} = b$ where a and b are positive.

The student will be able to:

- state that multiplication and division are inverse operations.
- demonstrate the multiplication and division properties of equality in numerical sentences.
- use the appropriate inverse operation to solve equations of the form $ax = b$ and $\frac{x}{a} = b$ where a and b are positive.

GOAL: To multiply and divide signed numbers.

The student will be able to:

- state and apply the techniques for multiplication and division of signed numbers to obtain the appropriate products and quotients.

GOAL: To solve equations of the form $\pm ax = \pm b$ and $\pm \frac{x}{a} = \pm b$.

The student will be able to:

- apply the techniques for multiplication and division of signed numbers.
- apply the techniques for equation solving to solve equations of the form $\pm ax = \pm b$ and $\pm \frac{x}{a} = \pm b$.

GOAL: To reinforce the solution of simple equations.

The student will be able to:

- select which property of equality to use to solve a one-step equation.
- solve any linear equation where only one property of equality must be used.

GOAL: To solve equations of the form $ax \pm b = c$ by trial and error.

Students will be able to:

- use substitution to determine whether or not a specific value of a variable is a solution to an equation of the form $ax \pm b = c$ or $\frac{x}{a} \pm b = c$.

GOAL: To solve equations of the form $ax \pm b = c$ using properties of equality.

Students will be able to:

- state that the addition or subtraction properties must be used before the multiplication or division properties in the solution of equations of the form $ax \pm b = c$.
- solve and check equations of the form $ax \pm b = c$.

GOAL: To solve equations of the form $\frac{ax}{b} = c$ using properties of equality.

Students will be able to:

- write the reciprocal of any number.
- state that dividing by any number is equivalent to multiplying by its reciprocal.
- solve and check equations of the form $\frac{ax}{b} = c$ using properties of equality.

GOAL: To solve equations of the form $\frac{ax}{b} \pm c = d$.

Students will be able to:

- state the sequence of steps required for the solution or equations of the form $\frac{ax}{b} \pm c = d$ using inverse operations.
- solve the equations and check the solutions.

GOAL: To review the solution of linear equations using one or more properties of equality.

Students will be able to:

- use formulas to solve problems by substituting given values and solving the resulting equations.
- determine if the solution satisfies the conditions of the problem.

Unit VIII. Tables, Graphs, and Coordinate Geometry

GOAL: To read and interpret data found in tables.

Students will be able to:
- provide examples in which presentation of data in tables is useful.
- read tables of data and answer specific questions relating to these data.
- describe ways of presenting data: lists, tables, charts, maps, graphs.

GOAL: To read and interpret pictographs (picture graphs).

Students will be able to:
- read the scale on a pictograph.
- translate the symbols on a pictograph into numerical quantities.
- extrapolate new information or form opinions using the data on a pictograph.

GOAL: To read and interpret bar graphs.

Students will be able to:
- identify bar graphs as a type of graph that can illustrate data more accurately than pictographs.
- translate the scale units used on a bar graph into numerical quantities.
- read and interpret bar graphs.
- read and interpret bar graphs with double sets of data.

GOAL: To read and interpret line graphs.

Students will be able to:
- identify line graphs as types of graphs that illustrate trends more effectively than bar graphs.
- read and interpret line graphs.
- state that line graphs tend to show a continuous series, process, or tendency (optional).

GOAL: To read and interpret circle graphs.

Students will be able to:
- identify circle graphs as good graphs to use when illustrating the subdivisions of a whole quantity.
- read and interpret circle graphs where the subdivisions of a whole are given as numerical quantities.
- compare the relative sizes of sectors of a circle by inspection.

GOAL: To define percent and find percent of a number.

Students will be able to:
- express percent as the ratio of a number to 100.
- find the percent of a number by expressing the percent as a fraction and multiplying.
- state that the sum of all the parts of a quantity is 100%.

GOAL: To express percents as decimals and to find a percent of a number.

Students will be able to:
- express whole number percents as decimals.
- find a percent of a number when the percent is expressed as a decimal.

GOAL: To locate points on a number line, to find the distance between two points and to locate a point midway between two other points.

Students will be able to:
- locate any signed number on the number line.
- state that the number associated with a point on the number line is called its coordinate.
- locate a point midway between two other points and determine its coordinate.
- find the distance between two given points on the number line.
- state that the midpoint of a line segment is the average of the coordinates of the end points.

GOAL: To name points on the coordinate plane using ordered number pairs.

Students will be able to:

- describe a location in a coordinate plane using two numbers (coordinates).
- distinguish between location (3, 2) and location (2, 3), and define an ordered number pair.
- identify coordinates of a point to the left of 0 on the horizontal number line as negative, and similarly, coordinates below 0 on the vertical number line as negative.
- label the horizontal number line with x, and call it the x-axis (horizontal axis).
- label the vertical number line with y, and call it the y-axis (vertical axis).
- locate the origin and state its coordinates.
- read and locate the coordinates of given points on the coordinate plane, including points on the axes.

GOAL: To locate points on the coordinate plane.

Students will be able to:

- plot points on the coordinate plane, given their coordinates.
- state that the first number in an ordered number pair is called the x-coordinate and the second is called the y-coordinate.

GOAL: To find the distance between 2 points on the coordinate plane.

Students will be able to:

- find the length of a line segment that is parallel to one of the coordinate axes.
- apply the Pythagorean Formula to find the length of a line segment that is not parallel to either coordinate axis.
- find the distance between 2 points on the coordinate plane.

GOAL: To determine the coordinates of the midpoint of a line segment.

Students will be able to:

- state that the x-coordinate of the midpoint of a line segment is the average of the x-coordinates of the endpoints.
- state that the y-coordinates of the midpoint of a line segment is the average of the y-coordinates of the endpoints.
- determine the coordinates of the midpoint of a line segment.

Unit IX. Banking and Taxes

GOAL: To compute simple interest.

Students will be able to:

- use the words deposit, withdrawal, principal, interest, interest rate, and balance to describe banking procedures.
- explain why a bank pays interest.
- state that interest rates are always expressed as an annual rate.
- identify the principal, rate, and time period in a bank interest problem.
- compute interest using the simple interest formula $I = Prt$, where t is an integral number of years.

GOAL: To compute simple interest.

Students will be able to:

- express non-integral percents as decimals.
- use the simple interest formula to calculate interest where the rate is a non-integral percent.

GOAL: To compute simple interest involving fractional parts of the year.

Students will be able to:

- express any number of months as a fraction of a year.
- express a non-integral percent as a fraction in lowest terms.
- use the simple interest formula to calculate interest where the rate is a non-integral percent and the time is a non-integral number of years.

GOAL: To understand the meaning of compound interest.

Students will be able to:

- differentiate between simple and compound interest by stating:
  1. that when calculating simple interest:
     a. the interest is figured all at once for the entire period,
     b. the principal does not change during the period.
  2. that when calculating compound interest:
     a. the interest is figured separately for each unit of time (e.g., per year for annual compounding),
     b. the principal increases after each unit of the time period (e.g., this year's principal equals last year's principal plus last year's interest).
- calculate interest compounded annually.

GOAL: To develop the concept of equal repayments for a loan.

Students will be able to:

- calculate the amount of interest charged on a loan.
- calculate the total amount to be repaid (interest plus principal).
- state that each installment is the quotient of the total amount borrowed divided by the number of equal installments.
- compute each installment on a loan.

GOAL: To introduce the idea of "bank discount".

Students will be able to:

- compute the amount of interest charged on a loan.
- compute the actual amount of money available to the borrower (net proceeds).
- determine whether a given amount yields sufficient net proceeds.

GOAL: To compute the selling price when discounting.

Students will be able to:

- compute the amount of a discount if the discount rate is a unit fraction.
- compute the selling price (net price) if the discount rate is a unit fraction.

GOAL: To find the selling price when the rate of discount is expressed as a percent.

Students will be able to:

- convert several common percents to their fractional equivalents (10%, 20%, 25%, 33⅓%, etc.)
- compute the net price where the discount rate is given as a percent by expressing the rate as a decimal or common fraction.

GOAL: To find the total cost of a purchase.

Students will be able to:

- calculate the sales tax (or tip) by finding the product of the expenditure and the rate of sales tax (or tip).
- express monetary values to the nearest cent.
- compute the total cost of a purchase including tax, tip, or both.

GOAL: To calculate the total cost of a purchase involving both discount and sales tax.

Students will be able to:

- state that sales tax is added after the sale price is calculated.
- calculate the purchase price for goods advertised in a newspaper sale including discounting and sales tax.

GOAL: To solve business and consumer problems involving rates.

Students will be able to:

- state the meaning of common business terms involving the rate expressed as a percent (commission, markup, successive discount).
- compute commissions, markups, and successive discounts when the rates are given.

Unit X. Areas

GOAL: To find the areas of rectangles.

Students will be able to:
- provide practical examples where area is used (e.g., floor tiles, carpeting, wallpaper).
- state that a surface (area) must be measured with a square unit, and is different from perimeter which is measured with linear units.
- find areas of rectangles by counting the number of squares they enclose on a grid.

GOAL: To calculate the areas of rectangles and squares.

Students will be able to:
- state that the area of a rectangle can be found using the formula $A = lw$ (or $A = bh$).
- state that the area of square can be found using the formula $A = s^2$.
- use the formulas $A = lw$ and $A = s^2$
  (a) to calculate areas and,
  (b) to find a missing dimension when the area and one dimension are given.

GOAL: To solve verbal problems involving area and perimeter.

Students will be able to:
- distinguish between area and perimeter in verbal problems.
- solve verbal problems involving area and perimeter of rectangles and squares.

GOAL: To solve problems involving areas of complex figures.

Students will be able to:
- calculate areas of complex figures involving rectangles by dividing the figures into component rectangles and adding.
- solve problems involving figures of this type.

GOAL: To find the area of a triangle.

Students will be able to:
- apply the formula $A = \frac{1}{2}bh$ to calculate the area of right triangles and express the area in square units.
- identify the base and height of any triangle where the bottom side is the base.
- use the formula $A = \frac{1}{2}bh$ to calculate the area of any triangle.
- use the formula $A = \frac{1}{2}bh$ to calculate the base or height of a triangle if the other dimensions are given.

GOAL: To find the areas of complex regions involving rectangles and triangles.

Students will be able to:
- divide complex regions given in a diagram into rectangles and triangles
- calculate the areas of complex regions involving rectangles and triangles.

GOAL: To find the area of a circle.

Students will be able to:
- state the formula used to find the area of a circle: $A = \pi r^2$.
- apply the formula to find the areas of circles using $\pi = \frac{22}{7}$

GOAL: To apply the formula for the area of circle.

Students will be able to:
- apply the formula $A = r^2$ to find the areas of circles, using $\pi = 3.14$.

Unit XI. Indirect Measure and Scaling

GOAL: To distinguish between direct and indirect measurement.

Students will be able to:

- describe situations in which a measurement of length or distance cannot be made directly.
- apply formulas to find measurements of quantities indirectly by using measurements that have been made directly.

GOAL: To understand the meaning and use of scale drawing.

Students will be able to:

- state a need for standard units of measure.
- use a scale to determine the actual number of units represented in a drawing.
- measure the length of line segments using a ruler.
- determine an actual distance given a unit scale and a scaled length.

GOAL: To identify similar figures.

Students will be able to:

- state that the enlargement or the reduction ratio is called a scale.
- compare any two quantities with a ratio.
- state that enlargements or reductions create figures similar to the original.
- state that when figures are similar, the corresponding parts (lines) are in proportion.
- identify a true proportion by:
  1. comparing fractions.
  2. using the proportion property.

GOAL: To use proportions to find unknown sides of similar triangles.

Students will be able to:

- use the proportion property to solve proportions (e.g., $\frac{a}{b} = \frac{x}{c}$).
- write and solve proportions to find an unknown side in similar triangles.

GOAL: To use proportions to solve problems involving ratios and rates.

Students will be able to:

- represent relationships in verbal problems as proportions involving rates or ratios.
- solve proportions using the proportion property.

GOAL: To use proportions to solve problems involving scaling.

Students will be able to:

- represent the relationships in problems by using proportions.
- solve problems involving scaling by using proportions.

Unit XII. Solid Geometry

GOAL: To introduce solid geometric figures and the concept of volume.

Students will be able to:

- identify plane and solid objects as rectangular, square, circular, and triangular.
- distinguish between drawings or objects which are plane or solid figures.
- state that a prism is named by the shape of its base.
- state that the space displaced by a solid object is different from length or area, and requires a cubic unit of measure.
- use cubes (sugar, plastic, etc.) to measure volume.

GOAL: To find volumes of rectangular solids.

Students will be able to:

- Use the formula v = 1wh to calculate the volume of a rectangular prism, where 1, w, and h are expressed as whole numbers, decimals and fractions.
- find a dimension of a rectangular prism if its volume and 2 dimensions are given.
- apply the formula v = 1wh to the solution of verbal problems.

GOAL: To find the volumes of prisms and cylinders.

Students will be able to:

- state that 1 x w is the area of the base of a rectangular prism, so that its volume is the product of the area of its base and its height.
- calculate the volume of any prism using the relationship that the volume is equal to the area of the base times the height of the prism.
- distinguish between prisms and cylinders.
- find the volume of a (right-circular) cylinder.

GOAL: To find the volumes of pyramids and cones.

Students will be able to:

- distinguish between pyramids and prisms by recognizing that pyramids have triangular sides and prisms have sides that are parallelograms.
- use V = l wh, or V = ⅓ the area of the base x height, to calculate the volume of a pyramid.
- distinguish between cones (circular base) and pyramids (polygon base).
- use V = ⅓ area of base x height to calculate the volume of a cone.
- identify a given geometric solid as a prism, a cylinder, a pyramid, or a cone.

GOAL: To find volumes of spheres.

Students will be able to:

- distinguish the sphere from other solid figures.
- use the formula V = 4/3 πr^3 to find volumes of spheres.

CONSUMER MATHEMATICS

INTRODUCTION

Consumer Mathematics (Volume I and Volume II) is a course designed to improve mathematical proficiency and understanding as the student is given practice in relevant problem-solving situations. It includes the mathematics skills needed to make sound consumer decisions. The purpose of this course is to review, reinforce, and extend concepts learned in the Fundamentals of Mathematics course. The focus of this course is on solving consumer-related problems. The use of a calculator is highly encouraged to allow the student to concentrate on the concept, rather than on computation.

Volume II of *Consumer Mathematics* contains computer applications for many of the topics contained in Volume I. The lessons involve using electronic spreadsheets and applying them to real-life situations. The electronic spreadsheet can be used for teaching problem solving as well as for the study and implementation of algorithms. Teachers may choose to integrate these lessons into the corresponding units from Volume I or they may choose to teach the lessons from Volume II after completing Volume I. This will enable the students to review the topics from Volume I through the computer applications from Volume II.

This course is at a higher level than *Fundamentals of Mathematics* and may be used for the second unit of credit (a course "beyond" *Fundamentals of Mathematics*) required by the state.

CONSUMER MATHEMATICS • Vol. I

Consumer Mathematics
Volume I
Table of Contents

Unit I. Calculators 121
Unit II. Earning a Living 123
Unit III. Managing Money 126
Unit IV. Leisure 129
Unit V. Mathematics in the Home 131
Unit VII. Indirect Measurement and Trigonometry 135

Unit 1. Calculators

GOAL: To perform the four basic operations on a hand-held calculator.

The student will be able to:
- use a hand-held calculator to solve simple problems involving addition, subtraction, multiplication and division.
- Predict the output when a simple calculation example is given.
- Predict the output when a calculation example involving decimals is given.
- Note to teachers: Where possible, students should be using the same type of calculator. Also check that the calculator in use is *algebraic*, i.e., the order of operations is the one used in algebra. (Calculators yielding 28 for $6+8\times2$ should NOT be used — except maybe for demonstration purposes later on.)

GOAL: To learn the meaning of the square root of a number. To find the square root of a number on a hand-held calculator.

The student will be able to:
- find the square root of a number (perfect squares only).
- use a hand-held calculator to square a given number.
- use a hand-held calculator to find the square root of a given number and round it to the nearest tenth.
- make a chart of squares and square roots for the integers from 1 through 20.

GOAL: To use a calculator to perform more complicated operations.

The student will be able to:
- do more complicated problems involving several operations on a calculator.
- use the memory of a calculator to store a denominator in order to then calculate the numerator of a more complicated problem.

GOAL: To round off the results of a complicated computation found on a calculator.

The student will be able to:
- use their calculators to find the results of a complicated set of calculations.
- round their results to the nearest
  a) whole number b) tenth c) hundredth

GOAL: To estimate the results of a computation problem.

The student will be able to:
- approximate the results of a complicated calculation.
- perform the calculations on a calculator.
- check if the results are what they expected.
- round off the answer.

GOAL: To use a calculator to help us balance a checkbook.

The student will be able to:
- use a calculator to find the balance as a result of a deposit.
- use a calculator to find the balance as a result of issuing a check.
- use a calculator to find the balance as a result of interest.
- use a calculator to find the balance as a result of several transactions.

GOAL: To use simple flowcharts to predict the output of a calculation.

The student will be able to:
- follow a flowchart to predict the output of a simple calculation or set of calculations.
- perform the operations called for in a given flowchart.
- find an error in the prediction (or performance) stages in using a given flowchart.

GOAL: To understand how changing the order of performing operations effects results.

The student will be able to:
- use the order of operations to predict the correct output of a set of calculations.
- predict the results when the sequence of operations is switched.

GOAL: To use calculators to help do problems involving percents.

The student will be able to use a calculator to:
- find a given percent of a number.
- find the discount on an item on sale.
- find the final price of an item on sale.
- check if their answers are reasonable.

GOAL: To use calculators to help find sales tax.

The student will be able to calculate (using a calculator):

- the sales tax on a given item if the rate is given as a percent.
- the total cost of an item if tax is to be included.
- and check if their answers are reasonable.

GOAL: To use calculators to find the total price of an article when we consider discounts and sales tax.

The student will be able to:

- use a calculator to do problems involving two stages:
  - — finding the price after a discount is considered.
  - — finding the actual cost when sales tax is included.
- check if the answers to such problems are reasonable.

GOAL: To use calculators to aid us in filling out tax forms.

The student will be able to:

- use a tax schedule along with a calculator to find the total amount of tax that must be paid.
- check if their answers to such problems are reasonable.

Unit II. Earning A Living

GOAL: To determine the cost of commuting to work.

The student will be able to:
- add, subtract and multiply decimals.
- compute the cost of commuting to work if:
  — one form of transportation is used.
  — more than one form of transportation is used.
- compute the total commuting costs given the:
  — one-way fare and the number of working days in the month.
  — monthly train fare, one-way subway fare and the number of days in the month.

GOAL: To find the total number of hours worked.

The student will be able to:
- add fractions and mixed numbers.
- express hours and minutes as fractions.
- determine the number of hours worked from time cards per day by computing the difference between time-in and time-out.
- determine the number of hours worked per week.

GOAL: To convert annual salary to monthly and semi-monthly salary.

The student will be able to:
- state what is meant by annual salary, monthly salary, semi-monthly salary, gross pay and pay period.
- compute the quotient of a decimal by a whole number.
- state and apply the following relationships:
  gross monthly pay = annual pay / 12
  semi-monthly pay = annual pay / 24

GOAL: To convert annual salary to weekly and bi-weekly salary.

The student will be able to:
- state what is meant by annual salary, weekly salary, bi-weekly salary and pay period.
- state and apply the following relationships:
  — weekly earnings = annual salary / 52.
  — bi-weekly earnings = annual salary / 26.

GOAL: To compute the hourly rate for salaried employees.

The student will be able to:
- divide decimals.
- find hourly rate given weekly salary using the relationship:
  Hourly rate = total weekly salary / total weekly hours.
- find weekly rate using the relationship:
  Weekly rate = total yearly salary / total weeks in the year.

GOAL: To compute earnings at an hourly rate.

The student will be able to:
- compute earnings when an employee is paid hourly.
- state and apply the relationship:
  Regular earnings for a week = hourly rate of pay x hours worked weekly.
- determine the wages an employee paid on a hourly basis loses because of lateness.
- determine the actual weekly earnings if pay is lost because of lateness using the relationship:
  Regular weekly earnings — loss in wages = actual weekly earnings.

GOAL: To compute a new yearly income if percent increase is known.

The student will be able to:
- convert percent to a decimal.
- find a percent of a number.
- compute amount of increase.
- compute new yearly increase if percent increase is known.

GOAL: To know how tips affect one's gross income.

The student will be able to:
- multiply a fraction by a decimal.
- explain jobs where tips are received.
- define what is meant by gross income.
- find gross income given information as to how "tips" are earned.

GOAL: To compute overtime earnings at an hourly rate.

The student will be able to:

- state the definition of overtime, time and one-half and double time.
- compute overtime wages using the relationships:
  - — total hours worked − regular work week hours = overtime hours.
  - — earnings for overtime = overtime hours worked x overtime rate.

GOAL: To compute gross earnings involving overtime.

The student will be able to:

- state the definition of gross earnings, regular time, overtime pay, time and one-half and double time.
- explain the procedure used to find the number of overtime hours worked and how to find the earnings for overtime.
- apply the relationships:
  - — total hours worked − regular work week hours = overtime hours.
  - — earnings for overtime = overtime hours x overtime rate.
- find the gross earnings involving overtime using the relationship:
  gross earnings = regular earnings + overtime earnings.

GOAL: To determine total earnings for employees paid straight commission.

The student will be able to:

- find a percent of a number.
- define commission.
- compute earnings when an employee is paid by commission.
- apply the relationship:
  - — Commission = rate of commission x total sales
  - — Commission = rate of commission per unit x amount sold.
- find the amount of commission if commission depends on total sales, fixed amount per unit or percent of sales.

GOAL: To compute gross pay for employees paid salary and commission.

The student will be able to:

- define gross pay and commission.
- compute gross pay for employees paid salary and commission.
- apply the relationships:
  - — Commission = rate of commission x total sales (or amount of units, etc.).
  - — Total earnings = gross pay = salary + commission.

GOAL: To compute gross pay for employees paid salary and graduated commission.

The student will be able to:

- explain what is meant by graduated commission and gross pay.
- add and multiply decimals.
- compute gross pay for employees paid salary and graduated commission.

GOAL: To determine earnings based on piecework.

The student will be able to:

- explain what is meant by earnings on a piece-rate basis.
- compute daily earnings when an employee is paid by the piece.
- compute weekly earnings when an employee is paid by the piece.
- find salaries by combining piece-work earnings and an hourly rate.

GOAL: To find the amount withheld from gross pay for federal income taxes and for social security.

The student will be able to:

- explain what is meant by deductions, FICA and gross pay.
- compute federal income tax given a specific percentage.
- find the amount of social security tax for a given salary.
- explain what is meant by maximum taxable earnings.

GOAL: To find the total amount of deductions from gross pay.

The student will be able to:

- explain what deductions may be withheld from gross pay.
- find the total amount of deductions from gross pay.

GOAL: To compute the net pay given the total amount of deductions.

The student will be able to:

- define gross pay, deductions from pay and net pay.
- find net pay using the relationship:
  Net pay = gross earnings − total deductions
- determine the amount of total deductions given the amount of gross pay and the amount of net pay.

GOAL: To determine net pay given specific amounts for various deductions.

The student will be able to:

- compute amount of required deductions from pay.
- compute amount of voluntary deductions from pay.
- compute total deductions from pay given specific amounts withheld from salary.
- find net pay given various deductions withheld from salary.

GOAL: To define the Consumer Price Index and understand how it relates to earning a living.

The student will be able to:

- explain the Consumer Price Index.
- explain what is meant by buying power.
- explain how the Consumer Price Index is related to buying power.
- determine the buying power for a particular item given the Consumer Price Index.

GOAL: To use information from classified ads to compute wages and compare jobs and make decisions on answering a classified ad.

The student will be able to:

- compare wages for various jobs using relationships given in the previous lessons.
- read classified ads to determine information necessary to compute wages for various jobs.
- read classified ads to determine information necessary to make decisions on answering an ad or taking a job.

Unit III. Managing Money

GOAL: To budget family income.

The student will be able to:
- identify monthly income sources and expense items.
- determine the total monthly income, expenditures and total cash flow by subtracting total expenses from total income.
- identify fixed and flexible expenses.
- project future expenses.

GOAL: To determine net worth.

The student will be able to:
- identify assets and liabilities.
- determine net worth by subtracting the total liabilities from the total assets.

GOAL: To read labels.

The student will be able to:
- determine the quantity contained in a package from its label.
- state the number of ounces in a pound or quart.
- convert quantities to pounds, quarts or hundred-count by dividing by the appropriate factor.

GOAL: To practice comparison shopping.

The student will be able to:
- compute the unit price of an item sold by the ounce, pound, quart or number by dividing the actual price by the quantity in ounces, quarts, pounds or count.
- compute the total price of an item by multiplying the unit price by the weight or quantity.
- determine the best buy by comparing the unit prices of several comparable items.

GOAL: To understand sales tax.

The student will be able to:
- identify sales tax rate, sales tax.
- convert % to a decimal.
- compute the amount of sales tax on an item by multiplying the price by the tax rate; from a sales tax chart.
- compute the total cost of an item by adding the sales tax to the total price.

GOAL: To shop from a catalog.

The student will be able to:
- read a sales catalog, for example: where is the index, where is the ordering information, etc.
- determine item numbers from a catalog.
- compute shipping and handling charges based on weight and destination.
- complete an order form.

GOAL: To shop at sales.

The student will be able to:
- identify list price, sale price, rate of discount, discount amount.
- compute the discount in dollars. For example, a $50 coat is marked 15% off. How much is taken off?
- compute the selling price.
- determine the list price of a sale item.

GOAL: To understand installment buying.

The student will be able to:
- identify down payment, finance charge.
- compute the finance charge and actual cost of a purchase.
- compare an installment purchase to a cash sale.
- determine the annual percentage rate (APR).

GOAL: To use a charge account.

The student will be able to:
- identify previous balance, average daily balance, minimum payment, annual fee.
- compute the monthly finance charge by multiplying the average daily balance by the monthly interest rate.
- compute the balance at any time by adding the previous balance, purchases and finance charge and subtracting payments.

GOAL: To use a savings account.

The student will be able to:
- identify deposits, withdrawals, interest.
- compute the savings account balance by adding deposits and interest to the previous balance and subtracting the withdrawals.
- explain money market accounts, time deposit accounts, CD's.

GOAL: To read a checking account statement.

The student will be able to:
- identify terms found on a checking account statement.
- locate entries on a checking account statement.
- determine the present balance by adding the deposits to the previous balance and subtracting the paid checks, fees and service charges.

GOAL: To use a checking account.

The student will be able to:
- identify the information on a check, such as check number, amount, date, signature, payee.
- explain the terms "pay to cash", endorsement, post-dated.
- write a check.
- complete a deposit slip.
- enter credits and debits into a checkbook register.
- compute the checking balance.

GOAL: To reconcile our checking account.

The student will be able to:
- identify checks and deposits which have cleared; outstanding checks and deposits; service charges.
- determine the actual balance by subtracting the service charges from the checkbook balance.
- determine the outstanding check total.
- determine the outstanding deposit total.
- reconcile the account by adding the outstanding deposits total to the statement balance, subtracting the outstanding check total from this, and seeing if this matches the checkbook balance.

GOAL: To understand simple interest.

The student will be able to:
- explain how money makes money.
- explain the difference between interest and principal; interest and interest rates.
- identify time periods.

GOAL: To understand compound interest.

The student will be able to:
- explain compound interest.
- identify n, the number of time periods. For example, if a bank compounds quarterly, how many time periods is 7 years?
- determine i, the interest rate per period. For example, determine i for an annual rate of 11¼%, compounded quarterly.
- explain daily compounding.

GOAL: To use interest formulas.

The student will be able to ...
- compute simple interest form the formula $I = PrT$.
- compute the amount accumulated from $A = P + I$.
- compute the amount accumulated with compound interest from the formula $A = P(1 + i)^n$, where n is the number of time periods, i is the interest rate per period.
- compute the interest after compounding by $I = A\text{-}P$.

GOAL: To use interest tables.

The student will be able to:
- read an interest table.
- interpolate between two values.
- compute simple and compound interest from a table.
- determine the time needed to accumulate a required amount using an interest table. For example, how long would it take $200 to become $300 at 8% interest, compounded quarterly?

GOAL: To compute the effective interest rate.

The student will be able to:
- explain nominal interest rate, N, and effective interest rate, E.
- determine the effective interest rate from the formula $E = (1 + N/n)^n - 1$

GOAL: To understand savings bonds.

The student will be able to:

- identify savings bond, T-bill.
- explain terms associated with savings bonds.
- compute the total interest from interest = face value − selling price.
- compute the current yield from annual interest / current price.

GOAL: To understand a retirement plan.

The student will be able to:

- identify social security, FICA, Investment Retirement Account (I.R.A.).
- compute the amount accumulated and average annual income after a given number of years.
- determine the annual retirement benefit.

Unit IV. Leisure

GOAL: To identify the costs of purchasing a new automobile.

The student will be able to:
- compute the sticker price of a new car.
- compute the dealer's cost of a new car.

GOAL: To know how much you should pay for a used car.

The student will be able to:
- read a used-car guide to determine:
  - — average retail value.
  - — additional options.
  - — options deductions.
  - — mileage deductions.
- compute the average retail price of a used automobile.

GOAL: To identify what automobile insurance is necessary to protect yourself from financial losses.

The student will be able to:
- use tables to determine rates for:
  - — property damage limits.
  - — bodily injury limits.
  - — comprehensive.
  - — collision with deductible.
- compute the annual premium for automobile insurance.

GOAL: To understand how the Driver-Rating Factor determines insurance premiums.

The student will be able to:
- determine the driver-rating factor from a table.
- list the factors that determine the rating.

GOAL: To identify the expenses of operating and maintaining an automobile.

The student will be able to:
- list variable costs (gasoline, tires, etc.)
- list fixed costs (automobile insurance, registration fees, depreciation, etc).
- compute the total cost per mile of operating and maintaining an automobile.

GOAL: To identify the expenses associated with automobile leasing.

The student will be able to:
- list charges for leasing an automobile:
  - — Daily rate vs. weekly rate.
  - — rate per mile.
  - — insurance.
  - — collision waivers.
- compute the cost per mile for leasing an automobile.

GOAL: To know the costs of using the rapid transit system.

The student will be able to:
- compute the monthly cost of single fares.
- find the cost of a monthly pass.
- compute the monthly cost of driving.
- determine whether public or private transportation is more economical.

GOAL: To know the costs of taking a taxicab.

The student will be able to:
- find the cost of the first mile or less.
- find the cost of additional miles or fractions of a mile.
- compute the total cost of taking a taxicab.

GOAL: To know the costs of air travel.

The student will be able to:
- determine from published flight schedules:
  - — arrival and departure times.
  - — fares for different classes of travel.
- compute the cost per mile of air travel.

GOAL: To plan a budget for vacation costs.

The student will be able to:
- list the factors determining the cost of a vacation:
  - — basic charge for length of time.
  - — mode of transportation.
  - — food and other expenses.
- compute the total vacation cost.

GOAL: To know the fees involved in belonging to a health club.

The student will be able to:
- compute the cost per visit.
- calculate savings from discounted membership fees.

GOAL: To plan for the expenses involved in recreational activities, (e.g. tennis, hiking, etc.)

The student will be able to:
- list fees associated with a recreational activity I e.g.) bowling.
  — facility fees.
  — equipment fees.
- calculate the total recreation cost.

GOAL: To estimate the cost of starting a hobby.

The student will be able to:
- list the cost associated with different leisure activities and hobbies e.g., gardening, cooking, listening to music.
- compute the cost of leisure activities and hobbies.

GOAL: To understand the golden rectangle.

The student will be able to ...
- State various uses of the Golden Rectangle.
  — Paintings
  — Architecture
  — Books
- Using the numerical 0 = 1.618 compute the length and width of a rectangle in the "divine proportion".

GOAL: List factors we should consider in buying a personal computer.

The student will be able to:
- list three different types of computers.
- define hardware, software, and peripherals.
- define RAM, ROM, BYTES, KILOBYTES.
- list 5 uses of a computer.
- compute the cost of a home computer system.

GOAL: To know the basic Basketball Statistics recorded.

The student will be able to:
- state three uses of basketball statistics (team and individual records, salaries, etc.)
- define field goals made-attempted, free-throws attempted-made rebounds, assists.
- compute field-goal percentage, free-throw percentages and rebounding and scoring averages.

GOAL: To read a baseball box score.

The student will be able to:
- read a baseball box score from a newspaper to determine:
  — bats, runs, hits, runs batted in errors.
  — innings pitched, hits, runs, earned runs, walks, strikeouts
- compute team totals, batting averages and earned run averages.

GOAL: To list the costs and benefits of a higher education.

The student will be able to:
- state the benefit of a higher education.
- compute annual expenses of a higher education based upon tuition, fees, books, and supplies, room and board, and other miscellaneous expenses.

GOAL: To know the chancy world between 0 and 1.

The student will be able to:
- define and compute the probability of an event occuring.
- define and compute the odds of an event occurring.

GOAL: To know the difference between improbable and impossible.

The student will be able to:
- interpret probabilities to distinguish between events which will definitely occur, are very likely to occur, and will definitely not occur.
- use the principle of multiplication to determine the number of possible ways an event can occur.

Unit V. Mathematics in the Home

GOAL: To list metric units of capacity.

The student will be able to:
- define milliliter in terms of liter.
- rename metric units of measure.
- choose a suitable unit of measure of capacity for given items.
- estimate, in metric units, the capacity of given items.
- convert from metric to English units and English to metric, using a calculator.

GOAL: To solve verbal problems in planning meals.

The student will be able to:
- adjust recipes to determine amounts of ingredients needed.

GOAL: To analyze calorie consumption.

The student will be able to:
- define a calorie.
- compute the total calorie intake of a meal.
- determine the net calorie gain based on diet and exercise.

GOAL: To list metric units of length.

The student will be able to:
- define millimeter, centimeter and kilometer in terms of meter.
- rename metric units of length.
- choose a suitable unit of length for given items.
- estimate, in metric units, the length of given items.
- convert from English to metric, and metric to English, using a calculator.

GOAL: To use scale drawings.

The student will be able to:-
- define scale drawing, representative ratio.
- compute scale dimensions of real objects.
- compute real lengths given a scale drawing.
- make a scale drawing of given figures using graph paper.

GOAL: To design a floor plan.

The student will be able to:
- determine the scale dimensions of rooms in an apartment floor plan using a predetermined scale.
- choose an appropriate scale for his/her own floor plan design.
- draw a scale drawing of a floor plan design on graph paper.

GOAL: To solve verbal problems using perimeter.

The student will be able to:
- compute the perimeter of various polygons.
- determine the quantity of material (fencing, molding, hedging, etc.) required to enclose various regions.
- determine the cost of enclosing these regions.

GOAL: To solve verbal problems using circumference.

The student will be able to:
- compute the circumference of a circle. Given the radius or diameter.
- find the radius of a circle with given circumference.
- find the length of an arc of a circle.
- compute the cost of enclosing a circular region.

GOAL: To solve verbal problems using area.

The student will be able to:
- Compute the area of:
  - — Triangles
  - — Rectangles
  - — Parallelograms
  - — Trapezoids
- compute the quantity of material and cost of material used in floor and wall coverings.

GOAL: To solve surface area problems.

The student will be able to:
- compute the surface area of rectangular solids, pyramids and frustums.
- compute the amount of material and cost of material required to manufacture or cover items with shapes indicated above.

GOAL: To solve area problems using circles.

The student will be able to:
- compute the area of circles.
- compute the area of sectors of circles.
- compute the amount of material needed to manufacture or cover circular regions.
- determine the cost of materials indicated above.

GOAL: To find volumes of solids.

The student will be able to:
- compute the volume of rectangular solids.
- compute the volume of cylinders.
- compute the volume of spheres.

GOAL: To solve verbal problems involving volume.

The student will be able to:
- determine the quantities necessary to fill solid figures.
- determine the costs of materials used to fill these solids.
- solve similar verbal problems involving volume.

GOAL: To determine power consumption.

The student will be able to:
- define watt, kilowatt and kilowatt hour.
- compute the number of kilowatt hours used in a household appliance.

GOAL: To compute the costs of electric appliances.

The student will be able to.
- compute the operating cost of electric appliances at a fixed cost per kilowatt hour.
- compute the monthly cost of several electric appliances on a sliding scale.
- compute the average annual cost of appliances based on depreciation, repair and operating costs.

GOAL: To read utility meters.

The student will be able to:
- Read a utility meter.
- Determine the quantity of
  — gas
  — electricity
  — water
  used by reading utility meters.

GOAL: To read utility bills.

The student will be able to:
- determine the date, previous and present meter readings and total cost based on a given utility (gas, electricity, water) bill.
- anticipate the date of the next bill.
- verify the total amount due by computation.
- compute the average monthly cost per kilowatt hour or 100 cubic feet of gas or water based on a utility bill.

GOAL: To solve problems involving measures of time.

The student will be able to:
- determine the amount of time elapsed between 2 given times.
- determine the time at which a task will be completed given the starting time and the length of the task.
- anticipate the cost of telephone calls based on a given cost schedule and duration of call.

GOAL: To convert temperatures from one scale to another.

The student will be able to:
- convert Fahrenheit to Celsius.
- convert Celsius to Fahrenheit.

GOAL: To list the insurance costs of maintaining a house.

The student will be able to:
- define renter's insurance, homeowner's insurance, co-insurance.
- determine insurance policy premiums.
- determine insurance company liability based on co-insurance.
- determine the average cost per $1000 of insurance.

Unit VI. Tables, Charts and Graphs

GOAL: To define statistics. To list the techniques we use in collecting data.

The student will be able to:
- give examples in which analysis of data is used to make decisions:
  - — budgets
  - — taxation
  - — loans
  - — transportation tables, etc.
- define statistics.
- identify and examine techniques of collecting, organizing and interpreting data.

GOAL: To read and interpret statistical information. To make decisions based upon information from tables.

The student will be able to:
- give examples in which presentation of information in tables and charts is useful.
- describe ways of presenting statistical information:
  - — tables
  - — charts
  - — graphs
  - — lists
- read tables and charts and answer questions related to the information given.
- make decisions based on information presented in tables and charts.

GOAL: To construct statistical tables.

The student will be able to:
- gather data on a specific topic, analyze data and determine how to present the data.
- develop the method of tallying.
- tally, organize and present the data in a table or chart.

GOAL: To describe data.

The student will be able to:
- calculate and interpret the mean, median and mode.
- solve verbal problems involving mean, median and mode.

GOAL: To construct frequency tables.

The student will be able to:
- define frequency.
- use their knowledge of tallying to organize a frequency table with appropriate intervals.
- use a frequency table to determine the interval containing the mean.
- construct a frequency table from a group of unorganized data.

GOAL: To construct cumulative frequency tables.

The student will be able to:
- define cumulative frequency.
- complete a cumulative frequency table given a frequency table.
- construct a cumulative frequency table from a group of unorganized data.

GOAL: To read and interpret pictographs.

The student will be able to:
- read the scale on a pictograph.
- calculate the numerical quantities of the symbols used in the pictograph.
- use a pictograph to answer questions, solve problems or make decisions based upon the data presented.

GOAL: To construct pictographs.

The student will be able to:
- determine what scale to use in constructing a pictograph.
- determine a symbol to use in a pictograph and the numerical value of each symbol.
- construct a pictograph from a group of statistical data.

GOAL: To read and interpret bar graphs.

The student will be able to:
- identify bar graphs as a type of graph which shows comparisons.
- calculate the numerical quantities of the bars in a bar graph.
- use a bar graph to answer questions, solve problems or make decisions based upon the data presented.

GOAL: To construct bar graphs.

The student will be able to:
- determine the scales and intervals to use in constructing a bar graph.
- construct a bar graph from statistical data.

GOAL: To understand a frequency histogram. To construct a frequency histogram.

The student will be able to:
- construct a frequency histogram with appropriate intervals.

GOAL: To define a cumulative frequency histogram. To construct a cumulative frequency histogram.

The student will be able to:
- construct a cumulative frequency histogram with appropriate intervals.

GOAL: To read and interpret line graphs.

The student will be able to:
- identify line graphs as a type of graph that shows trend.
- read the numerical quantities represented on a line graph.
- use a line graph to answer questions, solve problems or make decisions based upon the data presented.

GOAL: To construct line graphs.

The student will be able to:
- determine what scales and what intervals to use in constructing a line graph.
- construct a line graph from statistical data.

GOAL: To read and interpret circle graphs.

The student will be able to:
- identify circle graphs as a type of graph that shows part of a whole.
- read circle graphs where sectors are given in numerical quantities, percents or degree measure.
- use a circle graph to answer questions, solve problems or make decisions based upon the data presented.

GOAL: To prepare to construct circle graphs.

The student will be able to:
- make a table to convert numerical quantities or percents to degree measures.
- use a protractor to construct angles of a given degree measure.

GOAL: To construct circle graphs.

The student will be able to:
- take data given in numerical quantities or percents and prepare a table of angles in degree measure.
- construct a circle graph using statistical data.

GOAL: To apply our knowledge of statistics to help us be better consumers.

The student will be able to:
- read and interpret tax tables.
- use tax tables to solve problems.
- read and interpret graphs providing information on tax monies.

GOAL: To apply our knowledge of statistics to help us be better consumers. (Part 2)

The student will be able to:
- read and interpret mailing, postage, shipping and insurance tables.
- use mailing, postage, shipping and insurance tables to solve problems.

GOAL: To apply our knowledge of statistics to help us be better consumers. (Part 3)

The student will be able to:
- read and interpret credit, loan and discounting tables.
- use credit, loan and discounting tables to solve problems.

Unit VII. Indirect Measurement and Trigonometry

GOAL: To know the difference between direct and indirect measurement.

The student will be able to:
- state whether a direct measurement or indirect measurement is needed in a given situation.
- directly measure the area of a rectangle.
- indirectly measure the distance an object falls given the time it took to fall (direct measure).

GOAL: To use scale drawings and maps to find the distances between places.

The student will be able to:
- use a scale and a drawing (or map) to approximate distances
- use a scale diagram to approximate lengths in blueprints and other diagrams.

GOAL: To recognize similar triangles; to list conditions under which two triangles are similar.

The student will be able to:
- show whether or not two triangles are similar (by AA = AA).
- use similar triangles to set up a proportion to find the length of a side.

GOAL: To use similar triangles to measure indirectly.

The student will be able to:
- find the heights of objects using similar triangles and proportions.
- find the lengths of shadows given information leading to similar triangles.

GOAL: To list the parts of a right triangle.

The student will be able to:
- identify the legs and hypotenuse of a right triangle.
- identify the leg "opposite" a given acute angle of a right triangle.
- identify the leg "adjacent" to a given acute angle of a right triangle.
- fill in a chart giving all the above information for various triangles.

GOAL: To define the tangent ratio and to use a trigonometric table to find the tangent of a given angle.

The student will be able to:
- use a protractor to find the measure of a given angle.
- find the tangent of a given angle by measuring lengths of sides and dividing.
- develop a mini-table of tangents of angles.
- use a trigonometic table to find the tangent of a given angle.

GOAL: To use the tangent ratio to calculate lengths indirectly.

The student will be able to:
- find a missing length of a right triangle using the tangent radio.
- find a height, width, etc. from a "real life" problem indirectly, using the tangent ratio.

GOAL: To use the tangent radio in a verbal problem requiring us to calculate lengths indirectly.

The student will be able to:
- define the angle of elevation and the angle of depression.
- use the tangent ratio in a word problem to find a missing length (rounded).

Note: Calculators, if available, are very useful for this lesson.

GOAL: To state the Pythagorean Theorem and to use it to measure lengths indirectly.

The student will be able to:

- state the Pythagorean Theorem.
- use the Pythagorean Theorem to find a missing length in a right triangle.

GOAL: To use the Pythagorean Theorem to find a missing length (indirectly) in a word problem.

The student will be able to:

- use the Pythagorean Theorem to find a missing length described in a word problem.

Note: Calculators, if available are very useful for this lesson.

CONSUMER MATHEMATICS • Vol. II

COMPUTER APPLICATIONS

CONSUMER MATHEMATICS — COMPUTER APPLICATIONS
VOLUME II
TABLE OF CONTENTS

Appleworks Teacher's Guide

Lesson No.	Topic	Page No.
	Introduction to the Electronic Spreadsheet	
1L	Electronic Spreadsheets and Its Uses	141
2L	Using Electronic Spreadsheets to Retrieve and Manipulate Data; Accessing Appleworks Built-In Functions	141
3L	Using Appleworks to Format Data; Changing Formats	142
4L	Using the *Copy Command* to Replicate Large Lists of Data	142
5L	Rearranging Data on Spreadsheets	143
6L	Using the Printer; Preparing a Diskette	143

VisiCalc Teacher's Guide

Lesson No.	Topic	Page No.
	Introduction to the Electronic Spreadsheet	
1L	Electronic Spreadsheets and Its Uses	144
2L	Using Electronic Spreadsheets to Retrieve and Manipulate Data; Accessing VisiCalc's Built-In Functions	144
3L	Using VisiCalc to Format Data; Changing Formats	145
4L	Using the *Replicate Command* to Copy Large Lists of Data	145
5L	Rearranging Data on Spreadsheets	
6L	Using the Printer; Preparing a Diskette	146

Applications to Previous Units

Lesson No.	Topic	Page No.
	Unit III Calculators—Computer Applications	
2L	Using the Electronic Spreadsheet to Calculate Squares and Square Roots	147
8L	Calculations with Electronic Spreadsheet	
11L	Finding the Total Price of an Article Using the Electronic Spreadsheet	148

Unit: IV Earning a Living—Computer Applications

6L	Calculate Earnings Based on Hourly Rates Using the Electronic Spreadsheet	149
10L	Calculating Gross Earnings Involving Overtime Using the Electronic Spreadsheet	149
12L	Calculating Gross Pay for Employees Paid Both Salary and Commission Using the Electronic Spreadsheet	149
17L	Using the Electronic Spreadsheet to Calculate Net Pay	149

Unit: V Managing Money—Computer Applications

5L1	Computing Sales Tax Using the Electronic Spreadsheet	150
5L2	Using the Spreadsheet to Create and Print a Sales Tax Chart	150
14L	Using the Spreadsheet to Calculate Simple Interest	150
16L	Using the Simple Interest Table to Create a Compound Interest Table	150

Unit: VI Leisure—Computer Applications

1L	Using the Spreadsheet to Calculate the Cost of a New Automobile	151
15L	Using the Spreadsheet in Purchasing a Computer	151
17L	Using the Spreadsheet with Statistics	151

Lesson No.	Topic	Page No.
18L	Using the Spreadsheet with College Costs	151

Unit: VII Mathematics in the Home

3L	Using the Electronic Spreadsheet to Adjust Recipes, Determine Calorie Intake and Calculate Meal Costs	152
12L	Using the Electronic Spreadsheet to Calculate Areas, Perimeters and Volumes	152
19L	Using the Electronic Spreadsheet with Temperature Charts	152

Unit: VIII Tables, Charts and Graphs

3L	Using the Spreadsheet to Construct a Statistical Table	153
4L	Using the Spreadsheet to Calculate the Mean and the Median	153
10L	Using the Spreadsheet to Construct Bar Graphs and Pictographs	153

Unit: IX Indirect Measurement and Trigonometry

8L	Using the Spreadsheet with Trigonometric Functions	154

Unit I. Introduction to the Electronic Spreadsheet (Appleworks)

GOAL: To use an electronic spreadsheet.

The student will be able to:

- recognize the spreadsheet
- become familiar with its uses
- use the computer to access Appleworks
  - — understand all the options
  - — choose the correct option
- develop skill in:
  - — selecting the legal file names
  - — moving the cursor
    1) by entries.
    2) by pages.
  - — entering data.
  - — differentiating between a label and a value
  - — recognizing various parts of the spreadsheet
- correct mistakes in typing
- edit entries:
  - — toggling between change and insert modes
  - — recognizing the different cursors of Appleworks
- save the worksheet

GOAL: To use the electronic spreadsheet to retrieve and manipulate data. To access Appleworks built in functions.

The student will be able to:

- use the Appleworks catalog to retrieve previously saved data
- use the *coordinates* option of the *find command* to jump the cursor to a given position
- use the cursor as a pointer
- become familiar with the use of the built in Appleworks functions:
  - — sum
  - — minimum
  - — maximum
  - — average
  - — count
- remove data from the spreadsheet by using the:
  - — blank command
  - — delete command
  - — option 4 of the *main menu*: remove files from the desktop
- use the *insert command* to insert a new:
  - — column
  - — row
  - — block of data
- sort using the *arrange command* to place data:
  - — in numerical order
  - — in alphabetical order

GOAL: To use Appleworks to format data and to use techniques to change these formats.

The student will be able to:

- define terms:
  - — default
  - — format
  - — global
  - — justify
  - — truncate
- recognize and change Appleworks' default formatting for:
  - — values
  - — labels
- choose other formats for values, such as:
  - — appropriate
  - — dollar-and-cents
  - — fixed decimal
  - — comma
- change the formatting of:
  - — single entries
  - — columns
  - — rows
  - — blocks of data
  - — the entire worksheet
- change the column width of:
  - — all columns
  - — select columns
- understand the way that Appleworks recalculates during:
  - — automatic recalculation
  - — manual recalculation
- appreciate protection schemes that are built into the spreadsheet to preserve a user's data, and the commands that will eliminate this protection

GOAL: To use the *copy command* to replicate large lists of data so that it is unnecessary to rewrite formulas each time they are used.

The student will be able to:

- use the *copy command* and copy to a specified area of the spreadsheet:
  - — a single entry
  - — a row or column
  - — a block of data
- review previously learned Appleworks functions.
- replicate these functions by:
  - — entering coordinates
  - — using the cursor as a pointer
- differentiate between Source range and Target range
- Write a simple formula and replicate it using:
  - — columns
  - — rows
- reference other locations with:
  - — no change
  - — changes relative to the locations
- use the *zoom command* to toggle between displaying the formulas in every cell or the normally displayed numbers

GOAL: To prevent specific areas of the spreadsheet from scrolling out of view. To rearrange our data by moving columns or rows to new positions.

The student will be able to:

- use the *titles command* to freeze:
  - — all rows at and above the cursor
  - — all columns at and to the left of the cursor
  - — both columns and rows
  - — to return the spreadsheet to its default position
- use the *move command* to move data within the spreadsheet:
  - — move one or more columns to new column locations
  - — move one or more rows to new row locations
- review cursor manipulations:
  - — entering coordinates
  - — pointing
  - — moving right and up as opposed to left and down
- work with split spreadsheet:
  - — using two side by side windows
  - — using a top and bottom window
  - — using the open Apple-J to move the cursor between windows
- understand how Appleworks recalculates:
  - — by order
    - 1) calculation by columns
    - 2) calculation by rows
  - — by frequency
    - 1) automatic calculation
    - 2) manual calculation
- access the help screen:
  - — for a brief review of the available commands
  - — to see the standard values currently in effect

GOAL: To use the printer to prepare a hard copy of our spreadsheet. To prepare a diskette to receive and save our data.

The student will be able to:

- use the *print command* to make a hard copy of the spreadsheet.
- prepare a neat and orderly format for the printed form by:
  - — using appropriate margins
  - — using proper spacing
  - — adjusting paper width
  - — adjusting characters per inch
- select an appropriate title and print it on the worksheet
- explain the reason for initializing new diskettes
- use the main menu of the Appleworks spreadsheet to:
  - — initialize a new diskette
  - — delete files from the disk

Unit II: Introduction to the Electronic Spreadsheet (VisiCalc)

GOAL: To use electronic spreadsheets.

The student will be able to:

- recognize the spreadsheet
- become familiar with its uses
- use the computer to access VisiCalc:
- develop skill in:
  - — moving the cursor
  - — entering data
  - — differentiating between a label and a value
  - — recognizing various parts of the spreadsheet
- access the VisiCalc commands
- correct mistakes in typing
- save the worksheet

GOAL: To use the electronic spreadsheet to retrieve and manipulate data. To access VisiCalc's built in functions.

The student will be able to:

- use the *load* option of the *storage command* to retrieve previously saved data
- jump the cursor to a given position on the worksheet
- use the cursor as a pointer
- become familiar with the use of the built in VisiCalc function:
  - — sum
  - — minimum
  - — maximum
  - — average
  - — count
- remove data from the spreadsheet by using the:
  - — blank command
  - — delete command
  - — clear command
- use the *insert command* to insert a new:
  - — column
  - — row

GOAL: To use VisiCalc to format data and to change these formats.

The student will be able to:

- define terms:
  - — default
  - — format
  - — global
  - — justify
  - — truncate
- recognize and change VisiCalc's default formatting for:
  - — values
  - — labels
- use the *format command* to:
  - — round off numbers
  - — change to dollar-and-cents format
  - — replace a given number with asterisks
- use the *global command* to:
  - — reformat the entire worksheet as opposed to only one section
  - — change the size of the column width
- explore the way VisiCalc recalculates, and understand:
  - — automatic recalculation
  - — manual recalculation
- appreciate protection schemes that are built into the spreadsheet to preserve a user's data, and the commands that will eliminate this protection
- understand situations that cause VisiCalc to display *"error"*

GOAL: To use the *replicate command* to copy large lists of data so that it is unnecessary to rewrite formulas each time they are used.

The student will be able to:

- use the *replicate command* to create a new row/column:
  - — from a single entry
  - — from a row/column that already exists
- review previously learned VisiCalc functions
- replicate these functions by
  - — entering coordinates
  - — using the cursor as a pointer
- differentiate between Source range and Target range
- write a simple formula and replicate it using:
  - — columns
  - — rows
- use the *edit command* to change these formulas on the *edit/entry* line
- reference other locations with:
  - — no change
  - — changes relative to the locations

GOAL: To prevent specific areas of the spreadsheet from scrolling out of view. To rearrange our data by moving columns or rows to new positions.

The student will be able to:

- use the *titles command* to freeze:
  - — all rows at and above the cursor
  - — all columns at and to the left of the cursor
  - — both columns and rows
  - — to return the spreadsheet to its default position
- use the *move command* to move data within the spreadsheet:
  - — columns to new column location
  - — rows to new row locations
- review cursor locations
  - — entering coordinates
  - — pointing
  - — moving right and up as opposed to left and down
- work with the split spreadsheet:
  - — using the *window command*
  - — using the *semicolon* to move the cursor between windows
  - — change column widths in each window
- understand how VisiCalc recalculates:
  - — by order
    - 1) calculation by columns
    - 2) calculation by rows
  - — by frequency
    - 1) automatic calculation
    - 2) manual calculation
- force a recalculation by using the !

GOAL: To use the printer to prepare a hard copy of our spreadsheet. To prepare a diskette to receive and save our data.

The student will be able to:

- use the *print command* to make a hard copy of the spreadsheet
- prepare a neat and orderly format for the printed form by using:
  - — the repeating label command
  - — proper spacing, "-" and "&"
  - — special type face
    - 1) condensed (E H51)
    - 2) enlarged (HOW)
- select an appropriate title and print it on the worksheet using the:
  - — " setup option
  - — R, return character
  - — L, line feed
- explain the reason for initializing new diskettes
- use the storage command options to:
  - — initialize a new diskette
  - — delete files from the disk
  - — quit the VisiCalc program

Unit III: Calculators Computer Applications

GOAL: We use the power of the electronic spreadsheet to calculate squares and square roots.

The student will be able to:

- use the built in function SQRT () to find the square root of a number
- find squares by:
  - — multiplying a number by itself (N*N)
  - — using the to indicate exponentation (N 2)
- round square roots to the nearest integer using the:
  - — global format integer option (VisiCalc)
  - — fixed decimal value format (Appleworks)
- see how the spreadsheet remembers the precise value by returning values to their original state with the:
  - — global format general option (VisiCalc)
  - — appropriate value format (Appleworks)
- create a table of squares by:
  - — using the replicate command to speed calculations
  - — left justify values for clarity
  - — insert 2 rows on top for labels and delineation
  - — first format, then replicate to save steps
  - — print a single spaced worksheet with a title

GOAL: The electronic spreadsheet performs calculations in order.

The student will be able to:

- determine through experimentation that the spreadsheet gives no operation precedence in order of calculations
- discover that the spreadsheet calculates by:
  - — treating portions of a formula in parentheses first
  - — working the innermost of nested parentheses first
  - — calculating from left to right
- write formulas in such a way as to force the spreadsheet to give us a correct answer:
  - — 2 + 3*4 + 5 = 25, wrong
    2 + (3*4) + 5 = 19, correct
  - — 3 + 4/2 = 3.5, wrong
    3 + (4/2) = 5, correct
- correct errors caused by moving data that requires a specific position in a formula:
  - — due to forward reference, when a formula contains a reference to an entry that is recalculated after the answer cell
  - — when the answer to the sum of a range of data is positioned inside the range
  - — forcing a recalculation
- develop skill moving data and forcing recalculations

GOAL: To use the electronic spreadsheet to find the total price of an article after considering discounts and sales tax.

The student will be able to:

- enter data for sale items
- use the titles command to fix labels
- correct errors with:
  - — the blank command
  - — the edit command
- write formulas to calculate:
  - — discounted price
  - — sales tax
  - — sale price
- round all answers to dollars and cents format with:
  - — "$" option of the global command (VisiCalc)
  - — dollars option of the values format command (Appleworks)
- use replicate command to copy formulas relative to each item
- insert a row and use the repeating label to produce a neat format
- save and print the worksheet

Unit IV: Earning A Living Computer Applications

GOAL: To use the electronic spreadsheet to calculate earnings based on hourly rates.

The student will be able to:

- develop skill in entering data by creating a list of employee names and the number of hours worked
- use the titles command to freeze the worker's names in place
- write formulas that can convert minutes to hours
- use the sum function to find total hours worked
- use the replicate command to:
  - — replicate columns to copy hours worked in some cases
  - — replicate salaries skipping over groups of data
  - — replicate formulas across rows
- write formulas that will project monthly and yearly earnings
- use the storage command to save the worksheet named *earnings*.

GOAL: To use the electronic spreadsheet to calculate gross earnings involving overtime.

The student will be able to:

- load the *earnings* file previously saved
- use the delete column option to eliminate previously calculated earnings
- adjust hours worked to include totals over 40
- write formulas to determine:
  - — the number of overtime hours worked
  - — total earnings based on regular time plus time and a half for overtime
- explain what options will cause the spreadsheet to truncate, round values off, or display maximum precision
- use the replicate command with relative change to complete the body of the worksheet
- rename and save the file
- delete any unwanted files from the disk

GOAL: To use the electronic spreadsheet to calculate gross pay for employees paid both salary and commission.

The student will be able to:

- write formulas that compute:
  - — commission only
  - — total gross salary
- project monthly and yearly salary
- use the spreadsheet's ability to recalculate to see changes in salary when:
  - — sales increase and decrease
  - — commission rates fluctuate
- use the MAX () function on the total sales columns to determine leading salespersons
- use the arrange (Appleworks only) and print command to:
  - — print lists in alphabetical order
  - — print list in order of sales. (Highest to lowest.)
- save and print the worksheet

GOAL: To use the electronic spreadsheet to calculate net pay.

The student will be able to:

- make use of the files previously written during this unit by retrieving them and calculating a realistic payroll, based on deductions
- write a formula that will compute FICA based on 7.05% of earnings
- use the insert a column command to enter the number of employee dependents
- enter the withholding tax based on salary and dependents
- compute net salary based on the deductions entered
- use the replicate command to complete the payroll
- use the sum function to find the total:
  - — earnings
  - — FICA
  - — withholding tax
  - — payroll
- change the name of the file and save it with the storage command

Unit V: Managing Money
Computer Applications

GOAL: To use the spreadsheet to assist us in computing sales tax.

The student will be able to:

- develop skill in entering data on the spreadsheet by preparing a list of items and their price
- use pointers and formulas to calculate sales tax and total cost for the first item on the spreadsheet
- use the format option of the global command to convert all values to $ format
- use the replicate command to calculate:
  — tax for each item
  — total cost for each item
- use the sum function to determine:
  — total daily tax
  — total daily sales
- practice formula writing by comparing C + .07*C = TC with 1.07*C = TC.

GOAL: To use the spreadsheet to create and print a sales tax chart.

The student will be able to:

- create a sales tax chart using:
  — pointers and formulas
  — global $ format
  — replicating formulas
- neatly format the chart by:
  — inserting a row of labels
  — right justifying each label
  — drawing lines with the repeating character command
- use the storage command to:
  — save the chart
  — load the chart
- use the options of the print command to create a hard copy:
  — single or double spaced
  — with a title, a date
  — with special characters for line spacing and print style
- use the print command to print the sales tax chart

GOAL: To use the spreadsheet to calculate simple interest.

The student will be able to:

- generate a list of principle amounts using the replicate command on a column
- review the simple interest formula by entering it on the spreadsheet using a variable to represent the principle
- use the formula A3 + (A3*.07*1) to create a chart depicting 5 years of 7% simple interest on the principles previously generated
- replicate this formula across the row with the No change option
- understand why the parentheses are necessary in the above formula
- change the time period by editing the formula with the edit command for 2...5 years
- replicate formulas down columns with Relative change to complete the body of the table
- use the storage command to save the worksheet

GOAL: To use the simple interest table to create a compound interest one.

The student will be able to:

- retrieve the worksheet on simple interest
- position the cursor so that the simple interest formula appears on the coordinate line
- use the edit command to change formula to +A3* ((1 + .07) 1)
- Review the techniques of:
  — replicating across row with No change
  — edit each formula to reflect the correct amount of years
  — replicate down columns to change all data
- use the global format $ command to eliminate all but two decimal places
- understand that the global format $ command takes precedence over the global format justification and manually right justify all titles
- use the print command to print a neatly formatted worksheet:
  — VisiCalc: with a title
  — Appleworks: with variable column widths

Unit VI: Leisure — Computer Applications

GOAL: To use the spreadsheet to calculate the cost of a new automobile

The student will be able to:

- read and interpret the handout they will receive that lists automobile prices
- develop skill entering values and labels by creating a "sticker" for the window of their new car
- use the sum function to determine the total sticker price
- determine the way the spreadsheet calculates by changing the options they wish to purchase using:
  - — the delete command
  - — the move command
- print and save the worksheet
- clear the screen so that a new "sticker" price may be calculated

GOAL: To use the spreadsheet to help us decide what computer to purchase.

The student will be able to:

- become acquainted with the costs of various computers, peripherals and software by creating a computer price sheet
- become skilled moving data to various locations on the spreadsheet
- differentiate between the procedures for moving data down or right as opposed to up or left
- use the built in sum function to determine the costs of various packages
- understand that the correct sum is preserved when data is moved from the interior of a sum but moving data from an indicated endpoint requires a formula change

GOAL: To use the spreadsheet to keep track of the statistics of our favorite teams and the players on those teams.

The student will be able to:

- use the built in average function to compute:
  - — batting averages
  - — earned run averages
  - — scoring averages
- update daily statistics from newspaper reports
- write formulas to compute percentages
- use the replicate command to speed calculations on averages and percentages
- use the spreadsheets ability to round data to specific number of decimal places:
  - — Appleworks: any number through nine
  - — VisiCalc: nearest integer and nearest hundredth
- explain the reason that the word *error* appears on the spreadsheet

GOAL: To use the electronic spreadsheet to project future college costs.

The student will be able to:

- use the given table to calculate the cost of a four year college education
- generate the years by using a formula and the replicate command
- use the format command to justify correctly when adjacent columns are used for one heading
- use the " to indicate labels that begin with keystrokes other than letters
- explain that the inflation factor represents a projected 6% increase in yearly college costs
- write the formula and use the replicate command to complete the table
- experiment with $ and % to be used as repeating labels
- use the storage and print command to save the worksheet

Unit VII: Mathematics in the Home — Computer Applications

GOAL: To use the electronic spreadsheet to adjust recipes, determine calorie intake, and calculate meal costs.

The student will be able to:

- develop skill in entering data by typing several recipes onto the spreadsheet
- understand why the spreadsheet changes fractions to decimals and predict the result of entering 1/4, etc.
- create formulas that will:
  - — adjust recipes
  - — count calories
  - — determine the size of one portion
- use the replicate command to:
  - — copy the formulas
  - — adjust the amount of each ingredient
  - — copy the list of ingredients
- use the delete command to eliminate unwanted data from rows or columns
- use the repeating label command to simulate lines
- save and clear the worksheet
- reload previously saved files

GOAL: To use the electronic spreadsheet to calculate areas, perimeters, and volumes.

The student will be able to:

- access and use the built in value of PI (VisiCalc)
- enter numeric data by:
  - — typing each entry
  - — generate lists by copying one entry
  - — generate lists by replicating a formula
- write formulas for:
  - — area and circumference of circles
  - — perimeter and area of rectangles
  - — volumes of rectangular solids, pyramids, cylinders and spheres
- be aware of errors due to the spreadsheet's manner of calculating from left to right. PI*A4 2 must be entered as PI*(A4 2)
- use global value formatting as opposed to local formatting
- use the repeating label command to neatly format the worksheet

GOAL: To use the electronic spreadsheet to make a chart that lists each degree of temperature in both Fahrenheit and Celsius.

The student will be able to:

- create a formula to generate a list of numbers from 0 to 255
- use the formula C = (5/9)*(F-32) and the replicate command to calculate the celsius equivalents
- relate below freezing to negative numbers and generate a list from − 40 to + 100
- use the formula F = (9/5)*(C) + 32 and the replicate command to calculate the Fahrenheit equivalents
- adjust decimal places to different accuracies using the layout or format options
- develop ease using the window command to retain sections of the worksheet on the screen, that would otherwise scroll out of view
- save and print a neatly formatted chart with a title

Unit VIII: Tables, Charts and Graphs — Computer Applications

GOAL: To use the spreadsheet to construct a statistical table.

The student will be able to:

- understand why the spreadsheet is such a powerful tool in organizing and analyzing data:
  - — by learning how labels are formatted
  - — by becoming familiar with the formatting and use of values
- recognize relationships among groups of data and generate lists of numbers using a formula and the replicate command
- experiment with right, left and center (Appleworks) label justification to determine the most pleasing format
- use the titles command to freeze column headings and prevent data from scrolling off the screen
- use the built in functions to determine:
  - — tallies (sum)
  - — highest and lowest values (Max and Min)
  - — the amount of non zero values present (count)
- use the print command to make a hard copy

GOAL: To use the electronic spreadsheet to calculate the mean and the median.

The student will be able to:

- use the built in average function to calculate the mean of a group of values
- enter several groups of data, each containing a different amount of numbers, and use the replicate command to calculate all averages
- change some of the data numbers and see how the automatic recalculation changes the average
- use the recalculation option of the global command to change to manual calculation
- understand why recalculation no longer occurs when data is changed
- use the numerical order option of the arrange command (Appleworks) to sort the numbers
- determine the median of the sorted list

GOAL: To use the spreadsheet to construct bar graphs and pictographs.

The student will be able to:

- use the star option of the format command (VisiCalc) to substitute stars for a value in a given cell
- create a horizontal bar graph with a label for each bar
- create a pictograph using the star as the symbol
- construct a pictograph using the repeating label and the replicate command
- experiment with different keystrokes in making the vertical bars
- use the print command to make a hard copy of:
  - — the horizontal bar graph with a title
  - — the pictograph, with a title above and a legend below
  - — the vertical bar graph with single spacing

Unit IX: Indirect Measurement and Trigonometry — Computer Applications

GOAL: To use the electronic spreadsheet to measure angles and to use the spreadsheet's built in trigonometric functions.

The student will be able to:

- write a formula to find the third angle of a triangle
- use the replicate command to make calculations easier
- understand that the spreadsheet uses radian measure instead of degree measure
- select various lengths for the measure of a triangle's legs and calculate the tangent ratio (column C). VisiCalc users only
- define ATAN(N) as the angle whose tangent is N
- use the built in function ATAN (column C) to approximate the measure of the angle in radians (column D)
- approximate the measure of the angle in degrees using the factor 57.297
- use the built in TAN function TAN (column D), in column F
- explain why columns C and F have the same values
- explain why using a spreadsheet eliminates the need to have a trig table

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